

THE IRON AGE

Established
1855

New York, June 1, 1911

VOL. 87: No. 22

Published Every Thursday by the
DAVID WILLIAMS COMPANY
239 West 39th Street, New York

Entered at the New York Post Office as Second-Class Mail Matter.

Subscription Price, United States and Mexico, \$5.00 per Annum; to Canada,
\$7.50 per Annum; to Other Foreign Countries, \$10.00 per Annum.
Single Copies, 20 Cents.

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CONTENTS.

Some Steel Prices Reduced.....	1293
The Competition Rolled and Cast Material.....	1294
A Proposed Machinery Exposition.....	1295
An Unexpected Addition to the Free List.....	1295
The American Tobacco Decision.....	1296
Steel Prices Reduced.....	1296
American Society for Testing Materials.....	1297
The Iron, Steel & Heavy Hardware Association.....	1297
The American Iron and Steel Institute.....	1297
The Iron and Metal Markets.....	1298
Prices of Finished Iron and Steel f.o.b. Pittsburgh.....	1298
The Steel Corporation Investigation.....	1309
Iron and Industrial Stocks.....	1308
The American Society of Mechanical Engineers.....	1308
Republic Iron & Steel Company Operations.....	1308
Personal	1317
Obituary	1317
The Canadian Wire Rod Trade.....	1317
Coal Analysis by Consumers.....	1317
The Orient Coke Company.....	1317
The Salary Loan Evil.....	1318
Brown & Zortman Machinery Company Fire.....	1318
A Constitutional Compensation Law.....	1319
Titanium in Iron and Steel.....	1322
The Jamieson Coal & Coke Company.....	1324
Distributing Expense Burden.....	1325
Shipments from the Hill Mine.....	1326
A Special Centrifugal Blower.....	1327
The Growth of Cast Iron.....	1327
The Pittsburgh Foundry Conventions.....	1328
Electrically Driven Jarring Machine.....	1338
Exhibit of Roger Brown & Co.....	1338
Gas Cavities and Shot in Iron Castings.....	1339
Core Bench Jolt Rammer.....	1340
A Swinging Frame Grinding Machine.....	1341
Steel Making Pig Iron in 1910.....	1341
Four New Foundry Machines.....	1342
Briquetting Metal Borings.....	1344
The American Museum of Safety Chartered.....	1346
Oil Fuel Burners in the Foundry.....	1346
The American Society of Engineer Draftsmen.....	1346
The Andrews Side Frame Patent Sustained.....	1347
A Four-Spindle Drilling Machine.....	1347
Manganese and Silicon.....	1348
Progress in Heated Foundry Mixers.....	1349
An Automatic Saw Sharpener.....	1350
Barthold Gerdaun Visits this Country.....	1350
Roughing Tool for High-Speed Steel.....	1351
A New Self-Opening Die Head.....	1351
New Bullard Vertical Turret Lathe.....	1352
New Dry Blast Process Tested.....	1354
City Housing Problems to Be Considered.....	1355
The Nelson Valve Company's New Works.....	1356
The American Institute of Mining Engineers to Change Its Name	1361
Semi-Automatic Nut Tapper.....	1362
Customs Decisions.....	1362
The American High Duty Lathe.....	1363
High-Speed Saw with Automatic Stock Feed.....	1364
Jefferson Union Elbows.....	1365
More Burt Filters for the Gary Works.....	1365
An Unusual Stock of Swedish Steel.....	1365
The Machinery Markets.....	1366

Some Steel Prices Reduced

A Very Orderly Marking Down

No Wild Scramble for Orders

Those who hark back to the happenings of February, 1909, and expect a similar wild scramble for business among steel manufacturers to follow the events of the past week will very probably be disappointed. Conditions differ in many respects from those prevailing two years ago. Prices of steel products have not recently been as high by several dollars a ton as those prevailing in 1909 before the open market was declared. We are emerging gradually but surely from the shadow of disturbing influences outside of the steel trade. The two important anti-trust cases have been decided by the United States Supreme Court and large business interests are freed from that suspense. It is believed that railroad business is banking up by reason of the long period of enforced economy among railroad companies and that within a reasonable time buying in that direction will loosen. Congress cannot remain indefinitely in session with its agitation of the tariff question.

Revision in prices began last Wednesday, May 24, with the announcement by the Republic Iron & Steel Company that it proposed to act independently and would reduce steel bar prices \$3 per ton. The reduction was met by other leading steel bar manufacturers, and on Monday of this week a general meeting of steel manufacturers was held in this city at which prices of some other steel products were reduced for the purpose of adjusting them to some relation with the new steel bar prices. Steel billets and sheet bars were reduced \$2 per ton; structural shapes and plates \$1 per ton; light black and galvanized sheets \$4 per ton; heavy sheets \$2 per ton; no changes were made on wrought pipe, wire and tin plate. It is the opinion of leading steel manufacturers, expressed with force and evident confidence, that these reductions mark the limit of the downward movement in finished steel products.

As frequently happens when reductions are made, the new prices have not stimulated buying, but on the contrary appear to have checked it for the time being. Some contracting for steel bars was done last week by agricultural implement manufacturers and other large consumers, but the total, which is estimated at 100,000 tons, is much short of the quantity which should be under contract at this time. It is believed that at least a week or two must elapse for buyers to become convinced that no lower prices are now to be expected, but more normal buying conditions of business are confidently looked for by that time.

It is interesting to note in this connection that the activity in the pig iron market induced by price concessions on Southern and Virginia irons was short-lived. The recurrence to dullness is attributed by numerous pig iron sellers to the reduction in prices of steel products, which came at a critical moment when negotiations for considerable quantities of iron

were in progress. Pig iron buyers are now holding off to await more settled conditions. Basic pig iron has receded a little further and is now squarely at \$14, Pittsburgh, which is \$13.10 at Valley furnace.

It is somewhat encouraging to note that structural steel contracting was not seriously disturbed by the cut in steel bar prices last week. The volume of business was somewhat better than the average for the past few weeks, and it is stated that contracts which were pending when the steel bar action was announced were signed without hesitation by the parties interested. It is, of course, to be considered that prices on fabricated material have been relatively lower than on other steel products for some time.

Canadian buying in this country is said to have ceased because of the disturbance in steel prices, as consumers on that side of the border are, of course, inclined to take the same view of such occurrences as the domestic trade. Business with Canada has been very good for a long time, and it may be expected to develop greater activity as soon as it is seen that no further reductions occur. Some good business has been done for export by the United States Steel Products Company, which sold 8000 tons of 60lb rails to the New South Wales government, and 4000 tons of bridges to the Japanese government.

The copper trade is looking somewhat better, the past week having shown an increased volume of business, principally for exports, at slightly higher prices. Pig tin continues to rise, having now reached a higher price in London than at any time since the extraordinary upward movement in 1906-7.

The Competition Between Rolled and Cast Material

It was a matter of frequent remark in the middle nineties that rolled steel was supplanting cast iron at innumerable points, and the inference was that ultimately the proportion of pig iron consumed in making iron castings would be relatively small. Such has not been the outcome. In 1898, a year of very heavy pig-iron production, about 30 per cent. of the total was in foundry grades, while in 1910 the proportion was approximately 25 per cent. These estimates do not take account of pig iron used for puddling purposes, but the tonnage involved in this direction is relatively small, and probably has not changed greatly. The slight decrease in the proportion of foundry iron means merely that, while steel production has grown very rapidly, iron founding has grown slightly less rapidly, for in the twelve years pig-iron production increased by more than 130 per cent.

The reason the expectations mentioned have not been fulfilled is that the field showing the greater progress has changed. In the nineties one of the lines in the iron and steel industry in which the greatest progress was made was that of rolling steel. In 1890 steel-rolling methods were primitive. Steel was being rolled much as iron had been rolled. It was perfectly natural that when steel came to supplant iron it should at first be rolled in a similar manner and with similar equipment. The puddle ball was small and its contents far from homogeneous. There was no possibility of continuous mills proving efficient, because a small ball could not produce a long piece. The rolling was difficult and no method but that of hand labor could cope with the vagaries of the material.

The advent of steel brought about new conditions and advantage was promptly taken of those conditions, whereby during the nineties the cost of rolling was

very greatly reduced. In *The Iron Age* of July 3, 1890, billets were quoted at \$30.50 per gross ton, Pittsburgh, wire rods at \$43 per ton and steel tank plate at 2.75 cents per pound. Steel bars were not quoted at all, but iron bars were quoted at 1.80 cents per pound and iron plates at 2.15 cents. The spreads between semi-finished and finished products were enormous, and it was the progress in rolling methods and equipment in the nineties which reduced them, whereby the average prices in 1898 were as follows: Billets, \$15.20; tank plate, 1.08 cents; steel bars, 0.95 cent; structural shapes, 1.17 cents. The spread between a gross ton of billets and a net ton of finished rolled material in 1890 ranged from perhaps \$15 to \$25; in 1898 the spreads were \$3.80 for bars, \$6.40 for plates and \$8.20 for structural shapes. In recent months the spread has averaged about the same as then.

The large plate mills of the present time appeared in the nineties, there having been no great improvement in the past decade. The continuous merchant bar mill appeared in the late nineties and was greatly improved in the early years of the following decade. The present structural mills were born in the nineties. Altogether that decade belongs largely to the finishing mills, whereby the spread in selling price between crude steel and the finished rolled product was greatly reduced. Quite naturally during that period the rapid decrease in the cost of finished rolled steel invited the extension of its use and prompted predictions that eventually the awkwardly made iron casting would find little vogue when such cheap rolled sections were available and could be adapted to so many purposes.

The art of iron founding made relatively little progress in the nineties, and the iron casting appeared to have little future when its great competitor, the rolled steel section, had made such wonderful progress. At the end of the nineties the production of an iron casting was still an expensive process, and it cost almost twice as much to produce two identical castings as it did to produce one. The position at the time may be illustrated by a prediction made in 1899 by a close observer. He had toured England and the Continent observing the vogue there of the steel casting, and returned to the United States with the conviction that the castings of the future, such tonnage as would be cast at all, would be of steel and not of iron. In 1899 and 1900 the production of steel in the United States exceeded 10,000,000 tons, while the production of steel castings was slightly under 2 per cent. of the total steel made. In 1910 the proportion of steel castings to total steel was slightly under 4 per cent. The prediction, then, was not borne out, but from one viewpoint it was made on a rational basis. The idea evidently was that it cost so much to change the unformed pig iron into an iron casting that one might as well use the much stronger material, steel, to start with. The prediction failed of realization partly because in the past decade the cost of changing the unformed pig iron into the finished casting has been greatly reduced. The weight of a casting cannot be reduced in direct ratio to the increase in tensile strength of the material, because one loses in stiffness; the stresses are not so well borne when the section is smaller.

As the decade of the nineties belonged largely to the operations of rolling steel, so the past decade has belonged largely to the foundry art. Tremendous progress has been made whereby the cost of producing castings in point of time and effort extended has been enormously reduced. Last week's foundry convention at Pittsburgh illustrated the progress of a single year,

but the progress of a decade is simply astonishing, for almost everything the foundry now has is the product of the decade.

The line of demarcation between the cast material and rolled material was not drawn at all twenty years ago; no one knew where it should lie. Ten years later the progress in steel rolling indicated a place where it should be drawn, but wrongly. To-day the two methods of fabrication have been fairly well tried out. Neither has reached perfection, but each has made great progress, and the line between the fields of the two forms of material is not likely to be shifted greatly in the future. The iron casting is here to stay. The steel casting may gain somewhat more rapidly than the iron casting or than rolled material, but every new application of it indicates afresh that it is a means for accomplishing particular results only.

The trends toward the use of certain materials as against other materials are the resultants of numerous forces. One influence of importance making for the permanence of the iron casting is that of the geographical origin of raw material. In the old days iron mills were scattered. Their scrap originated at various points, pig iron was produced over wider areas than now, and then as always nearness to markets was a factor. The day of the iron mill has been passing. Even though the steel plant, whether making castings or rolled product, uses large quantities of scrap, no one usually thinks of locating such a plant near a source of scrap supply, if the point is far from pig iron. The iron foundry is different. Many foundries are held in their present locations because there is a steady supply of scrap to be obtained cheaply, whereas it costs considerably to move it to the great centers of consumption. The old material must be utilized and in many cases the iron foundry furnishes the most desirable means.

A Proposed Machinery Exposition

The magnificent exposition of foundry equipment and machine tools, which was an important feature of the convention of the American Foundrymen's Association at Pittsburgh, last week, has led to a movement for an annual exhibition on a larger scale. Briefly stated, the idea is to bring together under a single roof all classes of equipment which enters into the machine shop as well as the foundry. The plan is merely in its incipency. Complications of meeting places, dependent upon available exhibition space, hotel accommodations and accessibility to the greatest number of interested persons, are yet to be considered. The foundrymen's exhibition is a large nucleus. The commercial success of the exhibitors last week, in the form of orders booked, will doubtless cause next year's exposition at Buffalo to be even larger, perhaps to the limit of hall capacity.

The machine tool builders are becoming more keenly alert to this opportunity. A large percentage of foundries are adjuncts to machine shops and factories, and association members are important buyers of machine tools as well as foundry equipment. The normal growth of the exhibition will undoubtedly be large, even if no attempt be made to create a greater enterprise.

In regard to suitable quarters for a general exposition, as associations increase in sizes they are compelled to confine their meeting places to large centers where accommodations are ample and good. The Master Mechanics and Car Builders afford a striking

illustration of this, for their conventions grew to such proportions that it became necessary to seek one permanent meeting place and Atlantic City was chosen.

In the general discussion of the proposed exposition the suggestion is made that other associations, such as the National Machine Tool Builders, the American Society of Mechanical Engineers and the Master Mechanics and Master Car Builders might be induced to arrange their meetings to be coincident in time and place with the exposition, or for succeeding weeks or days.

Undoubtedly many buyers of machinery who are not members of any association would be attracted by the opportunity to study new types of equipment which, in most cases, would be seen operating under commercial conditions. The tendency would be eventually to cover a still broader field of equipment, including manufacturing tools which enter into factories as distinguished from machine shops. Foreign houses might find it worth while to send representatives, availing themselves of an opportunity which would greatly simplify the quest for new ideas.

The objection may be raised by some of the men interested in directing association affairs that the exhibition would become so important a factor that it would detract from the interest in the meetings. Another criticism is that the exposition would become too large for a proper appreciation of its contents on the part of the visitors. However, there is attraction in any plan which would advance interest in the products of American shops.

An Unexpected Addition to the Free List

Every new tariff act furnishes surprises. Slight changes in phraseology from previous acts may be found to have an important bearing that had been completely overlooked even by those who carefully scrutinize bills and amendments as they are passing through the Ways and Means Committee or through Congress. When the completed act goes into effect, tests are made by importers all along the line, and here and there a loophole is discovered through which some foreign manufactured article can be brought into this country at a much lower rate of duty than had been expected by domestic manufacturers in the same branch of trade. An instance of this kind has just occurred which affects the manufacturers of lawn mowers. The Board of United States General Appraisers has decided that lawn mowers imported into this country from England are free of duty under paragraph 476 of the tariff act of 1909, which reads as follows:

Plows, tooth and disk harrows, harvesters, reapers, agricultural drills and planters, mowers, horserakes, cultivators, threshing machines, and cotton gins 15 per centum ad valorem; provided, that any of the foregoing, when imported from any country, dependency, province or colony which imposes no tax or duty on like articles imported from the United States, shall be imported free of duty.

No distinction is made by the appraisers between the smallest kind of a mower used by a gardener and the largest horse-drawn mowing machines used on farms. The term "mower" is held to apply to all such articles indiscriminately. As England imposes no duty on mowers when imported from this country, it is held that such mowers when imported from England are free. There are likely to be other surprises in the new tariff act as further opportunities develop for testing it.

Beating Down Machinery Prices

In times of keen competition for any business that may be in sight, the process known in the vernacular of salesmen as "sweating the bidders" is frequently employed by purchasing agents when placing large machinery orders. The process consists chiefly of playing one bidder against another in successive interviews, to get the original quotations lowered. An important manufacturer recently inquired for quotations on a machine of a certain type, and on the day the proposals were opened all the companies bidding were represented by their salesmen. The purchasing agent interviewed the salesmen one at a time, and after getting from each what was declared to be his lowest price told him to wait in an anteroom for the decision. Later he recalled a few of them, to whom he impressively said that the contract lay among them and would go to the one who could make the largest reduction in price. There was some hurried telegraphing, and in each case the home office wired a lower figure. The man who secured the contract admitted that his price was ridiculously low and that the job would result in little or no profit to his company.

Such buying methods are clearly reprehensible, and those who resort to sharp practices of this kind commit a serious offense against general business ethics. They lower the tone of commercial dealings. This occurrence brought about spirited price-cutting among sellers of a certain class of machinery and upset their confidence in each other. It would be difficult to suggest a preventive for such cases, but it may be said that the machinery maker who always quotes the lowest figure consistent with his business policy and sticks to it is not bothered by "sweating" tactics. He does not accept business at a sacrifice to keep it away from his competitors.

The American Tobacco Decision

Large Corporations Now Have a Rule of Procedure

The United States Supreme Court handed down its decision in the suit against the American Tobacco Company on Monday. The decision, which clarifies the situation even more than the Standard Oil decision, declares that the company has deliberately and willfully violated the Sherman anti-trust law and orders it to reorganize so as to bring itself within the law. Chief Justice White in discussing the remedy to be applied by the court, said it might be one of two things, either an injunction ordering its dissolution, and prohibiting it from doing any further interstate business; or the appointment of a receiver to take over its vast business and bring it within the law. Both of these remedies he dismissed upon consideration, chiefly because of the danger either would be almost certain to work upon innocent outsiders. Then he delivered the decree of the court, which points out the way in which the organization is to be effected. The decree consists of four points, as follows:

1. That the combination in and of itself as well as each and all of the elements composing it, whether corporate or individual, whether considered collective or separately, be decreed to be in restraint of trade and an attempt to monopolize and a monopolization within the first and second sections of the anti-trust act.
2. That the court below, in order to give effective force to our decree in this regard, be directed to hear the parties, by evidence or otherwise, as it may be deemed proper, for the purpose of ascertaining and determining upon some plan or method of dissolving the combination and of recreating out of the elements now composing it a new condition which shall be honestly in harmony with and not repugnant to the law.
3. That for the accomplishment of these purposes, tak-

ing into view the difficulty of the situation, a period of six months is allowed from the receipt of our mandate, with leave, however, in the event, in the judgment of the court below, the necessities of the situation require, to extend such period to a further time not to exceed sixty days.

4. That, in the event before the expiration of the period thus fixed a condition of disintegration in harmony with the law is not brought about, either as the consequence of the action of the court in determining an issue on the subject or in accepting a plan agreed upon, it shall be the duty of the court, either by way of an injunction restraining the movement of the products of the combination in the channels of interstate or foreign commerce, or by the appointment of a receiver, to give effect to the requirements of the statute.

Thus the tobacco company gets eight months in which to complete a reorganization under the immediate supervision of the New York circuit court. It has full liberty to devise its own plan, but the plan must be satisfactory to the circuit court before it can be adopted, and the company has warning that if a satisfactory plan is not found within eight months there may be issued an injunction stopping all its interstate business or it may be thrown into the hands of a receiver.

Its new plan must be in full harmony with the law, but the circuit court is there to tell it just how to obtain that harmony. The contention of big business that there was nowhere under the government any agency that could tell it authoritatively what it could do under the law, and what it could not do, finds its answer here. There can be no question that the reorganization of this company will be taken as the model set up by the courts of the form in which big business may proceed without fear of being in violation of the law.

Steel Prices Reduced

The United States Steel Corporation, with its subsidiaries and practically all of the independent steel manufacturers of the country, decided on Monday, says the *New York Times*, to meet the cut in prices made last week by the Republic Iron & Steel Company. The chief product of the Republic Company is bars, and its reduction on that line was met last week by several of the subsidiaries and independents individually, including the Carnegie Steel Company. The trade was allowed to understand that this reduction from \$1.40 per 100 lb. to \$1.25 would be met in taking orders, but Monday's action went beyond that of the Republic Company by including other products than bars in the cut. It did not, however, affect rails, wire or tin plate.

It was at a conference at the Metropolitan Club, New York, that the decision to make this general reduction was reached. A luncheon given by Judge Elbert H. Gary, chairman of the United States Steel Corporation, began there at 1.30 and concluded at 5.30. It was attended by between 50 and 60 steel manufacturers. Judge Gary announced the result of the meeting as follows:

Representatives of the leading manufacturers of finished steel (except the Republic) met at luncheon at the Metropolitan Club to-day and existing conditions were fully discussed. It was the unanimous opinion that co-operation, as heretofore fully explained, should be continued.

Opinions were expressed that recent developments seem to require some changes in prices. Subsidiary companies of the United States Steel Corporation have decided to make adjustments to become effective June 1, and it is believed that these will be generally followed. The commodities affected, with the new prices, are as follows:

- Steel bars (15 cents per 100 lb. off), \$1.25 base.
- Plates and structural shapes (5 cents per 100 lb. off), \$1.35 base.
- Black sheets (20 cents per 100 lb. off), 2 cents per lb. for No. 28 gauge.
- Galvanized sheets, 3 cents per lb. for No. 28 gauge.
- Blue annealed sheets (10 cents per 100 lb. off), 1.50 cents per lb. for No. 10 gauge.
- Steel billets, 4 in. square and larger, \$21 per gross ton.
- Sheet bars, \$22 per gross ton.
- All free on board Pittsburgh, effective June 1, 1911, for shipment prior to Oct. 1.

Judge Gary said that he discussed conditions at length in his address at the meeting, but would add nothing to his formal statement at this time. His speech, he said, would be available for publication as soon as it was transcribed by the stenographers.

American Society for Testing Materials

Programme for the Annual Convention at Atlantic City,
June 27—July 1

The programme for the fourteenth annual meeting of the American Society for Testing Materials, to be held at Hotel Traymore, Atlantic City, N. J., June 27-July 1, is as follows:

FIRST SESSION—TUESDAY, June 27, 3 P. M.

Annual report of the executive committee.
Report of Committee A-3, on standard specifications for cast iron and finished castings. Walter Wood, chairman.
Report of Committee B-1, on standard specifications for hard-drawn copper wire. J. A. Capp, chairman.
Report of Committee C-4, on standard specifications and tests for clay and cement sewer pipes. Rudolph Hering, chairman.
Report of Committee C-3, on standard specifications for paving and building brick. D. E. Douty, chairman.
Election of officers.
Miscellaneous business.

SECOND SESSION—TUESDAY, June 27, 8 P. M.

Annual address by the president, American Society for Testing Materials.
The manufacture of pure irons in open-hearth furnaces. Allerton S. Cushman.
Measured strains on engineering structures. James E. Howard.
A study of the heat treatment of some low-carbon nickel steels. Henry Fay and John M. Bierer.
Flue sheet cinders, cause of formation in locomotives. Robert Job.

THIRD SESSION—WEDNESDAY, June 28, 10 A. M.

ON STEEL.

Report of Committee A-1, on standard specifications for steel. William R. Webster, chairman.
Report of Committee A-4, on heat treatment of iron and steel. Henry M. Howe, chairman.
Grain-size, a function of both time and temperature. Henry M. Howe.
On the heat treatment of a nickel steel. Wm. Campbell and H. B. Allen.

A comparison of the properties of an acid and a basic open-hearth steel of similar composition. Henry Fay.
Studies on steel tires. Robert Job and Milton L. Hersey.
Ductility in rail steel. P. H. Dudley.

THE AFTERNOON OF WEDNESDAY, JUNE 28, WILL BE RESERVED FOR GENERAL RECREATION.

FOURTH SESSION—WEDNESDAY, June 28, 8 P. M.

ON PRESERVATIVE COATINGS.

Report of Committee D-1, on preservative coatings for structural materials. S. S. Voorhees, chairman.
Report of Committee A-5, on the corrosion of iron and steel. Allerton S. Cushman, chairman.
Further results of the Westinghouse, Church, Kerr & Co. paint tests. C. M. Chapman.
The value of the sulphuric acid corrosion test. C. M. Chapman.
The practical testing of drying and semi-drying paint oils. Henry A. Gardner.
A novel method of detecting resin oil and mineral oil in other oils. A. E. Outerbridge, Jr.

FIFTH SESSION—THURSDAY, JUNE 29, 10 A. M.

ON CEMENT AND CONCRETE.

Practical tests of sand and gravel proposed for use in concrete. Russell S. Greenman.
Some experiments on the incrustation and absorption of concrete. Abel O. Anderson.
The determination of stresses in a reinforced concrete member subject to axial load in flexure. S. Ingberg.
The expansion and contraction of concrete while hardening. Albert T. Goldbeck.
The properties of magnesium cement, mortars and concretes. C. Derleth, Jr., and A. C. Alvarez.
Disintegration of concrete. Alfred H. White.
The effect of high-pressure steam on the crushing strength of concrete. Rudolph J. Wig.

SIXTH SESSION—THURSDAY, JUNE 29, 3 P. M.

ON STEEL.

Report of Committee A-7, on the tempering and testing of steel springs and standard specifications for spring steel. Henry Souther, chairman.
Hardness tests. Bradley Stoughton and J. S. Macgregor.
Hardness in its relation to other physical properties. D. E. Douty.
A comparison of five methods of hardness measurement. D. E. Douty.

The property of hardness in metals and materials. Albert F. Shore.

Strength of steel from structural shapes. E. L. Hancock.
Recent developments in testing of boiler tubes. F. N. Speller.

THE EVENING OF THURSDAY, JUNE 29, WILL BE RESERVED FOR A MUSICAL SMOKER.

SEVENTH SESSION—FRIDAY, JUNE 30, 10 A. M.

ON BITUMENS, ETC.

Report of Committee D-4, on standard tests for road materials. L. W. Page, chairman.
A new consistometer for use in testing bituminous road materials. W. W. Crosby.
Improved instruments for the physical testing of bituminous materials—Paper III. Herbert Abraham.
A proposed method of testing the melting point and softening point of compounds. Henry W. Fisher.
Organic residues from soluble bitumen determinations. Prévost Hubbard and C. S. Reeve.

EIGHTH SESSION—FRIDAY, JUNE 30, 3 P. M.

ON TESTING APPARATUS AND METHODS.

Standard methods for testing sewer pipe and drain tile. A. Marsten.
Report of Committee A-6, on the magnetic testing of iron and steel. Charles W. Burrows, chairman.
A new method of testing the endurance of case-hardened gears and pinions. J. S. Macgregor and Bradley Stoughton.
New types of impact testing machines for determining fragility of metals. T. Y. Olsen.
A new type of autographic transverse testing machine for research testing or regular foundry practice. T. Y. Olsen.

THE EVENING OF FRIDAY, JUNE 30, WILL BE RESERVED FOR RECREATION.

NINTH SESSION—SATURDAY, JULY 1, 10 A. M.

MISCELLANEOUS.

The Fritz Engineering Laboratory of Lehigh University. Frank P. McKibben.

The variation of tensile strength with the percentage of carbon in iron carbon alloys. C. R. Jones.

The effect of copper in iron on the acid corrosion test. W. H. Walker.

Recent analyses of tests on structural timbers made by the forest service. McGarvey Cline.

The Brinell ball test applied to wood. W. K. Hatt.

Notes on anti-friction alloys. Wm. Campbell.

Some further experiments upon the absorption, porosity and specific gravity of building brick. D. E. Douty and L. L. Beebe.

The Iron, Steel & Heavy Hardware Association

The second convention of the American Iron, Steel & Heavy Hardware Association was held in Detroit May 24-26. E. P. Sanderson, Boston, the first vice-president, presided in the absence of President E. D. Kimball. E. F. Yarnelle, Mossman, Yarnelle & Co., Ft. Wayne, Ind., was appointed secretary by the executive committee and will devote his entire time to the work of the association, traveling in the interests of the heavy hardware trade.

At the opening session Thursday afternoon George C. McMaster, Mutual Wheel Company, Moline, Ill., read an interesting paper on the relationship of the jobber and manufacturer. He criticised the selling of goods by manufacturers to small dealers who are not jobbers in reality, and urged that manufacturers carefully scrutinize all accounts to ascertain if such customers are rightfully entitled to jobbers' prices. He objected to the manner in which the steel business is handled, saying, "The market price of steel is always public, and anyone that buys a car-load gets the same price as the jobber. This is very unfair to the jobber who carries a good stock of steel on hand."

J. A. Gregg, Nicols, Dean & Gregg, St. Paul, Minn., read a paper on the "Effect of the Automobile on the Heavy Hardware Trade and How to Meet It." He pointed out that, in spite of the advent of the automobile, in 1910 there was one horse to every four persons in this country, as against one horse to every six persons in 1900, and that the horseshoe manufacturers report an increase in business amounting to 55 per cent. in these 10 years. At the same time there has been no curtailment in the sale of wagons and buggies.

George E. Enos, Buffalo, presented a paper on "The Position of the Jobber in Regard to Specialty Salesmen," and W. E. Bittenbender one on "The Cost of Doing Business."

Boston was selected as the place for the next meeting, and it was decided to consider San Francisco for the 1915 convention.

These officers were elected: President, E. P. Sanderson, Boston; first vice-president, Charles E. Faeth, Kansas City, Mo.; second vice-president, H. E. Treadway, Dubuque, Iowa; secretary, E. F. Yarnelle, Ft. Wayne, Ind. Executive committee—Charles E. Faeth, Kansas City, Mo., chairman; J. Henry Ruwe, Brooklyn, N. Y.; A. C. Dietrich, Baltimore, Md.; J. A. Gregg, St. Paul, Minn.; C. M. Roehm, Detroit, Mich.; E. W. A. Waterhouse, San Francisco.

The American Iron and Steel Institute

At the meeting of the American Iron and Steel Institute, held in New York City last week, the old board of officers was re-elected, as follows: President, E. H. Gary; first vice-president, Powell Stackhouse; second vice-president, Willis L. King; third vice-president, Charles M. Schwab; treasurer, Edward Bailey; secretary, James T. McCleary. The committee on welfare work reported that it had engaged Dr. Thomas Darlington, for six years health commissioner of New York City, to have immediate charge of this work.

The Ohio Machine Tool Company, Kenton, Ohio, has been purchased by the controlling interests of the Cleveland Punch & Shear Works Company, Cleveland, and C. C. Swift, secretary and treasurer of the latter concern, has located at Kenton and will be in charge of the plant. The familiar line of planers and sharpeners will continue to be manufactured and in addition larger sizes of planers up to 60 in. will be placed on the market in the near future.

The Iron and Metal Markets

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one-month and one year previous.
PIG IRON, Per Gross Ton:

	May 31 1911.	May 24 1911.	Apr. 26 1911.	May 25 1910.
Foundry No. 2 standard, Phila- delphia.....	\$15.50	\$15.50	\$15.50	\$17.00
Foundry No. 2, Valley Furnace	13.75	13.75	13.75	15.00
Foundry No. 2 Southern, Cin- cinnati.....	13.75	13.75	14.25	14.75
Foundry No. 2, Birmingham, Ala.	10.50	10.50	11.00	11.50
Foundry No. 2 local, at furnace, Chicago.....	15.00	15.00	15.00	17.00
Basic, delivered, eastern Pa....	14.50	14.50	15.00	16.25
Basic, Valley furnace.....	13.10	13.25	13.75	15.00
Bessemer, Pittsburgh.....	15.90	15.90	15.90	16.90
Gray forge, Pittsburgh.....	14.15	14.15	14.40	15.90
Lake Superior charcoal, Chicago	17.00	17.00	17.50	18.50

COKE, CONNELLSVILLE,

Per Net Ton, at oven:				
Furnace coke, prompt shipment	1.45	1.45	1.55	1.70
Furnace coke, future delivery..	1.75	1.75	1.75	1.80
Foundry coke, prompt shipment	1.75	1.75	2.00	2.25
Foundry coke, future delivery..	2.00	2.00	2.20	2.40

BILLETS, &c., Per Gross Ton:

Bessemer billets, Pittsburgh....	21.00	23.00	23.00	25.50
Forging billets, Pittsburgh.....	26.00	28.00	28.00	31.00
Open hearth billets, Philadelphia	23.40	25.40	25.40	29.00
Wire rods, Pittsburgh.....	29.00	29.00	29.00	32.00

OLD MATERIAL, Per Gross Ton:

Iron rails, Chicago.....	14.50	14.50	14.25	17.50
Iron rails, Philadelphia.....	16.75	16.75	17.00	20.00
Car wheels, Chicago.....	12.75	12.75	13.25	15.50
Car wheels, Philadelphia.....	13.00	13.00	13.00	15.00
Heavy steel scrap, Pittsburgh....	13.00	13.00	12.50	15.25
Heavy steel scrap, Chicago.....	10.25	10.25	11.50	13.50
Heavy steel scrap, Philadelphia	13.00	13.00	13.00	14.50

FINISHED IRON AND STEEL,

Per Pound:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill..	1.25	1.25	1.25	1.25
Refined iron bars, Philadelphia..	1.27	1.27	1.32½	1.52½
Common iron bars, Chicago.....	1.20	1.22	1.25	1.47½
Common iron bars, Pittsburgh..	1.25	1.30	1.35	1.55
Steel bars, tidewater, New York	1.41	1.56	1.56	1.61
Steel bars, Pittsburgh.....	1.25	1.40	1.40	1.45
Tank plates, tidewater, New York	1.51	1.56	1.36	1.66
Tank plates, Pittsburgh.....	1.35	1.40	1.40	1.50
Beams, tidewater, New York....	1.51	1.56	1.56	1.66
Beams, Pittsburgh.....	1.35	1.40	1.40	1.50
Angles, tidewater, New York....	1.51	1.56	1.56	1.66
Angles, Pittsburgh.....	1.35	1.40	1.40	1.50
Skelp, grooved steel, Pittsburgh.	1.30	1.30	1.30	1.50
Skelp, sheared steel, Pittsburgh	1.35	1.35	1.35	1.60

SHEETS, NAILS AND WIRE,

Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.00	2.20	2.20	2.40
Cut nails, Pittsburgh.....	1.80	1.80	1.80	1.80
Barb wire, galvanized, Pittsburgh†	1.60	1.60	1.65	1.80
	2.10	2.10	2.10	2.10

METALS.

Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	12.45	12.37½	12.37½	13.00
Electrolytic copper, New York..	12.25	12.12½	12.12½	12.87½
Spelter, New York.....	5.50	5.50	5.50	5.30
Spelter, St. Louis.....	5.20	5.20	5.30	5.15
Lead, New York.....	4.37½	4.37½	4.42½	4.37½
Lead, St. Louis.....	4.22½	4.22½	4.27½	4.22½
Tin, New York.....	45.50	44.60	42.50	33.25
Antimony, Hallett, New York..	8.95	9.00	9.00	8.12½
Tin plate, 100 lb. box, New York	\$3.94	\$3.94	\$3.94	\$3.84

* The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.
† These prices are for largest lots to jobbers.

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought boiler tubes.

Structural Material.—I-beams and channels, 3 to 15 in., inclusive, 1.35c. to 1.40c., net; I-beams over 15 in., 1.45c. to 1.50c., net; H-beams over 8 in., 1.50c. to 1.55c.; angles 3 to 6 in., inclusive, ¼ in. and up, 1.35c. to 1.40c.,

net; angles over 6 in., 1.45c. to 1.50c., net; angles, 3 in. on one or both legs, less than ¼ in. thick, 1.40c., plus full extras as per steel bar card effective September 1, 1909; tees, 3 in. and up, 1.40c., net; zzees, 3 in. and up, 1.35c. to 1.40c., net; angles, channels and tees under 3-in., 1.40c., base, plus full extras as per steel bar card of September 1, 1909; deck beams and bulb angles, 1.65c. to 1.70c., net; hand rail tees, 2.45c.; checkered and corrugated plates, 2.45c., net.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.35c. to 1.40c., base. Following are stipulations prescribed by manufacturers, with extras to be added to base price (per pound) of plates:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. thick and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, are considered ¼ in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Gauges under ¼ in. to and including 3-16 in. on thin nest edge.....	\$0.10
Gauges under 3-16 in. to and including No. 8.....	.13
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including all straight taper plates) 3-ft. and over in length.....	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive firebox steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft. inclusive.....	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive.....	.50
Cutting to lengths or diameters under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.
TERMS.—Net cash 30 days.

Sheets.—Makers' prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual discounts for small lots from store, are as follows: Blue annealed sheets, Nos. 3 to 8, U. S. standard gauge, 1.45c.; Nos. 9 and 10, 1.55c.; Nos. 11 and 12, 1.60c.; Nos. 13 and 14, 1.65c.; Nos. 15 and 16, 1.75c. One pass, cold rolled, box annealed sheets, Nos. 10 to 12, 1.65c.; Nos. 13 and 14, 1.70c.; Nos. 15 and 16, 1.75c.; Nos. 17 to 21, 1.80c.; Nos. 22, 23 and 24, 1.85c.; Nos. 25 and 26, 1.90c.; No. 27, 1.95c.; No. 28, 2c.; No. 29, 2.05c.; No. 30, 2.15c. Three pass, cold rolled sheets, box annealed, are as follows: Nos. 15 and 16, 1.85c.; Nos. 17 to 21, 1.90c.; Nos. 22 to 24, 1.95c.; Nos. 25 and 26, 2c.; No. 27, 2.05c.; No. 28, 2.10c.; No. 29, 2.15c.; No. 30, 2.25c. Painted roofing sheets, No. 28, \$1.40 per square. Galvanized sheets, No. 28, \$2.55 per square for 2½-in. corrugations. All above prices are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount 10 days from date of invoice.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from October 1:

	Butt Weld.		Steel.		Iron.	
	Black.	Galv.	Black.	Galv.	Black.	Galv.
1 to 1½ in.....	75	63	71	59	49	43
¾ in.....	79	69	75	65	53	47
¾ to 1½ in.....	80	70	76	66	54	48
2 to 3 in.....	76	66	72	62	50	44
2 in.....	78	68	74	64	52	46
2½ to 4 in.....	77	67	73	63	51	45
4½ to 6 in.....	75	65	71	61	49	43
7 to 12 in.....	75	65	71	61	49	43
13 to 15 in.....	15½	..	..	..	..	..
Butt Weld, extra strong, plain ends, card weight.	69	59	65	55	43	37
¼ in.....	74	64	70	60	48	42
¾ in.....	78	68	74	64	52	46
¾ to 1½ in.....	79	69	75	65	53	47
2 to 3 in.....	76	66	72	62	50	44
Lap Weld, extra strong, plain ends, card weight.	75	65	71	61	49	43
2 in.....	77	67	73	63	51	45
2½ to 4 in.....	76	66	72	62	50	44
4½ to 6 in.....	75	65	71	61	49	43
7 to 8 in.....	69	59	65	55	43	37
9 to 12 in.....	64	54	60	50	48	42
Butt Weld, double extra strong, plain ends, card weight.	64	54	60	50	48	42
¼ in.....	67	57	63	53	41	35
¾ to 1½ in.....	67	57	63	53	41	35
2 to 3 in.....	69	59	65	55	43	37

THE IRON AND METAL MARKETS

Lap Weld, double extra strong, plain ends, card weight.				
2 in.	65	59	61	55
2½ to 4 in.	67	61	63	57
4½ to 6 in.	66	60	62	56
7 to 8 in.	59	49	55	45
Plugged and Reamed.				
1 to 1½, 2 to 3 in. Butt Weld	Will be sold at two (2) points lower basing (higher price) than merchants or card weight pipe. Butt or lap weld, as specified.			
2, 2½ to 4 in. Lap Weld				
The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.				

Boiler Tubes.—Discounts on lap welded steel boiler tubes to jobbers in carloads are now as follows:

	Steel.
1½ to 2½ in.	65
2½ in.	67½
2½ to 3½ in.	70
3½ to 4½ in.	72½
5 to 6 in.	65
7 to 13 in.	62½
Less than carloads to destinations east of the Mississippi River will be sold at delivered discounts for carloads lowered by two points for lengths 22 feet and under; longer lengths f.o.b. Pittsburgh. Usual extras to jobbers and boiler manufacturers.	

Wire Rods and Wire.—Bessemer, open hearth and chain rods, \$29. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, \$1.60, galvanized \$1.90; carload lots, to retailers, annealed \$1.65, galvanized \$1.95. Galvanized barb wire, to jobbers, \$2.10; painted, \$1.80. Wire nails, to jobbers, \$1.80.

The following table gives the prices to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, Per 100 Lb.								
Nos.	0 to 9	10	11	12	12½	13	14	15 16
Annealed	\$1.75	1.80	1.85	1.90	2.00	2.10	2.20	2.30
Galvanized	2.05	2.10	2.15	2.20	2.30	2.40	2.80	2.90
Market and Stone Wire in Bundles, Discount from Standard List.								
Bright and Annealed:								
9 and coarser							.80	
10 to 18							.80 and 10	
19 to 26							.80 and 10 and 2½	
27 to 36							.80 and 5	
Galvanized:								
9 and coarser							.75 and 10	
10 to 16							.75 and 10	
17 to 26							.72½ and 10	
27 to 36							.72½	
Coppered or Liquor Finished:								
9 and coarser							.75 and 10	
10 to 26							.75 and 10	
27 to 36							.70 and 10 and 5	
Tinned:								
6 to 18							.75 and 10 and 10	

Pittsburgh

PARK BUILDING, May 31, 1911.—(By Telephone.)

Pig Iron.—The market is very dull and there is no large inquiry. It is not believed that the reduction in prices made on Monday on some forms of finished iron and steel will be reflected in pig iron, prices on which have been low for some time, with possibly the exception of Bessemer, which has simply been held by main strength at \$15, Valley furnace, for some months. The local situation in basic iron is being disturbed by some scrap dealers who are getting such iron in exchange for scrap and then offering the iron in the open market at lower prices than the furnaces will name. There is nothing doing in Bessemer or foundry iron. We quote as follows: Bessemer pig iron, \$15 nominally; malleable Bessemer, \$13.50; basic, \$13.10; No. 2 foundry, \$13.50; gray forge, \$13.25, all at Valley furnace, teh freight rate to the Pittsburgh district being 90c. a ton.

Steel.—The cut of \$2 a ton in prices of billets and sheet bars may possibly stid up some new business, but it is too early yet to determine whether consumers that are not covered by regular contracts will take hold and place orders at the new prices, which are as follows: Bessemer and open-hearth billets, 4x4 in. and up to, but not including, 10x10 in., at \$21, bse. and sheet and tin bars in 30-ft. lengths, \$22; 1½-in. billets, \$22; forging billets, \$26, base, usual extras for sizes and carbons—all prices, f.o.b. Pittsburgh or Youngstown districts, freight to destination added.

(By Mail.)

Whether the lower prices made on Monday at the steel meeting in New York will bring out the long-desired new orders and held up specifications in any large volume remains to be seen, but at the moment this seems doubtful. When the cut of \$3 a ton was made in steel bars by the Republic Iron & Steel Company, May 24, there was no wild scramble on the part of con-

sumers to cover, and, while the leading steel bar interests sold a fair tonnage of steel bars to the implement makers and wagon builders for delivery over the year commencing July 1, it is claimed the actual quantity sold on contracts did not reach 100,000 tons and was probably under that figure. For some months, plain material and plates had been sold by some mills at 1.35c. or below, prices on black and galvanized and also on roofing sheets have been shaded anywhere from \$2 to \$4 a ton, while on open-hearth billets and sheet bars regular prices have been shaded by some mills from \$1.50 to \$2 a ton. It is evidently the determination of the Steel Corporation and the other large steel interests to hold the market if possible, but it is not believed the lower prices will be immediately attractive to consumers. It is understood that on contracts placed for steel bars at 1.25c a guarantee against decline in price was given to apply on unshipped portions of any contracts. What effect the new prices on finished iron and steel will have on pig iron remains to be seen, but will probably result in still lower prices on basic and Bessemer iron. In the past week basic iron has sold on the basis of \$13.10, Valley, or \$14, Pittsburgh. Bessemer iron is still held nominally by the furnaces at \$15, but there have been no sales in this market at that price for some months. Malleable Bessemer, foundry and gray forge are also weak. For a long time very little new business has been offered in steel billets or sheet bars, and in fact there has not been enough new business to test prices, practically all consumers, large or small, being covered by contracts. It is a notable fact that prices on tin plate, pipe and wire products have not been disturbed. In the case of tin plate, consumers are pretty well covered through third quarter, and some over remainder of the year. In pipe, prices have been regarded as low for a long time, the heavy cut of several years ago of \$12 a ton, only \$2 of which has since been restored, put the price of pipe on a low basis and it was felt that no cut in prices of pipe was necessary. In wire nails, the situation is more easily controlled, and, as buying is pretty well over for the next three of four months, a reduction in price would not have stimulated demand and would have been useless. The scrap trade is showing a little betterment in demand, but coke is dull and neglected with prices ruling low.

Ferromanganese.—Reports are that the Middletown, Ohio, steel interest has bought 3000 tons of foreign 80 per cent. ferro for delivery over second half of the year at about \$36.50, Baltimore. We also quote a sale of two cars, or about 60 tons, to a local consumer for June and July delivery at the same price. We quote 80 per cent. foreign ferro at \$36.50 to \$36.75, Baltimore, with a freight rate of \$1.95 a ton for delivery in the Pittsburgh district.

Ferrosilicon.—A contract is reported to have been closed with a local consumer for upwards of 250 tons of 50 per cent., for delivery over second half at about \$52, Pittsburgh. New inquiry is light, most consumers being covered. We quote 50 per cent. at \$52 to \$53, Pittsburgh, for delivery through the third quarter; 10 per cent. blast furnace silicon, \$22; 11 per cent., \$24, and 12 per cent., \$25, f.o.b. cars, Ashland and Jisco furnaces.

Muck Bar.—The market is dull and neglected, and we continue to quote best grades of muck bar made from all pig iron at nominally \$28.50 to \$29, Pittsburgh.

Skelp.—A sale of 1500 tons of grooved steel skelp for June and July delivery is reported on the basis of about 1.27½c., Pittsburgh. We quote grooved steel skelp, 1.27½c. to 1.30c.; sheared steel skelp, 1.32½c. to 1.35c.; grooved iron skelp, 1.55c. to 1.60c., and sheared iron skelp, 1.65c. to 1.70c., all for delivery at consumers' mills in the Pittsburgh district, usual terms.

Wire Rods.—The dull condition of the wire trade is reflected in wire rods, new inquiry for which is very dull. We quote Bessemer, open-hearth and chain rods at \$29, Pittsburgh, but on a firm offer this price might be shaded.

Steel Rails.—The largest contract for standard sections taken by the Carnegie Steel Company in the past week was one for 2000 tons, but it entered other smaller orders and also some contracts for foreign shipment. The concern also received orders and specifications in the past week for about 3000 tons of light rails. Prices on light rails are as follows: 12-lb. rails, 1.25c.; 16, 20 and 25-lb., 1.21c. to 1.25c.; 30 and 35-lb., 1.20c., and 40 and 45-lb., 1.16c. The prices are f.o.b. at mill, plus freight, and are the minimum of the market on carload lots, small lots being sold at a little higher price. Standard sections are held at 1.25c. per pound.

THE IRON AND METAL MARKETS

Structural Material.—No important business has been placed in the past week, the trade waiting for the result of the steel meeting held in New York on Monday, at which prices on plain material were reduced \$1 a ton. The cut of \$3 a ton in steel bars last week puts the price on small angles under 3-in. at 1.25c. The John Eichleay, Jr., Company has taken a small asphalt plant, about 100 tons, and a city pumping station about 150 tons. We now quote beams and channels up to 15 in. at 1.35c., Pittsburgh.

Plates.—All new orders for plates were held up in the past week, waiting for the action at the steel meeting, at which prices were reduced \$1 a ton. This lower price of 1.35c., is the figure at which plates have been selling by some mills on narrow sizes for some time. No orders for steel cars were placed in the past week, and there is only one important inquiry in the market, this being from the Queen & Crescent, which is taking bids for 1000 steel cars. We quote tank plates $\frac{3}{4}$ in. and heavier at 1.35c., Pittsburgh.

Sheets.—The sheet trade has been in very unsatisfactory condition for some time, new orders and specifications having been steadily decreasing, while cutting in prices has been more pronounced. The reduction of \$4 a ton in black and galvanized sheets, and \$1 a ton in blue annealed sheets, puts the market at a level of values that it is believed does not allow any further cutting in prices, especially by sheet mills that have to buy their sheet bars. It is hoped the reduction in prices will stimulate new demand, which has been very dull for some time. The new prices on black and galvanized, and also on roofing sheets, are given on a previous page.

Tin Plate.—The present season is always the duller in the tin plate trade of the whole year as regards new buying, but specifications against new contracts from the can makers have been coming in quite freely for the past two or three weeks. No change in prices of tin plate was made at the steel meeting on Monday, as it was realized that the buying season is over and any reduction in prices would not stimulate new demand, but would only disturb present contracts. Most consumers of tin plate are covered into second and third quarters of the year, and in some cases over the entire year. It is estimated that only from 65 to 70 per cent. of tin plate capacity is active at present. We quote 100-lb. coke plates for delivery over balance of the year at \$3.70 per base box f.o.b. Pittsburgh.

Bars.—Last week the Republic Iron & Steel Company announced independently a cut of \$3 a ton in prices of steel bars, or from 1.40c. to 1.25c., base. This price was at once met by the other large steel bar makers, but so far has resulted in only a comparatively small amount of new business being placed, estimated at not over 100,000 tons in all, and on which prices have been guaranteed against decline. It is not believed the implement makers and wagon builders will take hold very vigorously in the matter of placing new contracts until fully assured that the market will not go below 1.25c., which is the situation at present. We quote soft steel bars rolled from billets at 1.25c., and common iron bars at 1.25c. to 1.30c. f.o.b. Pittsburgh. This reduction in price of steel bars will no doubt result in the leading steel bar mills that sign the Amalgamated scale, in asking a lower wage scale for puddling and heating for the year beginning July 1. A conference between the steel and iron bar mills and the Amalgamated Association on the new wage scales is to be held in Cambridge Springs next week.

Shafting.—In view of the reductions in prices on other forms of finished iron and steel, it is probable the makers of shafting will announce a reduction in discounts at an early date. New business is very light, and specifications against contracts are unsatisfactory. The present discounts on cold rolled steel shafting are 57 per cent. off in carloads, and 52 per cent. in less than carloads, delivered in base territory, but these discounts have been more or less shaded for some time.

Spelter.—The market is dull and weak, and very few new orders are being placed. We quote prime grades of Western spelter at 5.17 $\frac{1}{2}$ c., East St. Louis, equal to 5.30c., Pittsburgh.

Hoops and Bands.—There is very little new demand, being only for small lots, and specifications against contracts have been light for some time. Hoop prices are continued on the basis of 1.45c., but band prices have been reduced to 1.25c., base, to conform to the new steel bar price, taking extras as per steel bar card.

Merchant Steel.—New orders and specifications entered by the mills in May showed a decided falling off as compared with April. The lower prices on other finished forms of iron and steel will probably mean a revision of prices to a lower basis on the different grades of merchant steel. Nominal prices in effect are as follows: Iron finished tire, $\frac{3}{4}$ x $1\frac{1}{2}$ in. and heavier, 1.40c., base; under these sizes, 1.55c.; planished tire, 1.60c.; channel tire, 1.80c., base; toe calk, 1.90c.; flat sleigh shoe, 1.55c.; concave or convex, 1.75c.; cutter shoes, tapered or bent, 2.25c.; spring steel, 2c.; machinery steel, smooth finish, 1.90c.

Rivets.—As noted in this report last week, there is a good deal of new inquiry in the market for rivets, but orders were held up waiting the result of the steel meeting in New York on May 29. Regular prices on structural rivets remain at 1.90c., and on boiler rivets at 2c., but actual prices on structural rivets are about 1.75c., and on boiler rivets 1.80c. in large lots, and these prices are sometimes shaded on desirable orders.

Wire Products.—No reductions in prices of wire products were made at the steel meeting, no doubt for the reason that new buying for this season is pretty well over and a reduction in prices would not have stimulated new business, but on the contrary, would have seriously disturbed present contracts on books of the mills on all of which the regular price of \$1.80 on wire nails will be charged on all shipments on and after June 1. New demand for wire and wire nails is very dull, and only for small lots and specifications against contracts continue very unsatisfactory. We quote galvanized barb wire at \$2.10; painted, \$1.80; annealed fence wire, \$1.60; galvanized, \$1.90; wire nails, \$1.80, and cut nails, \$1.60, f.o.b. Pittsburgh, full freight to destination added.

Spikes.—As yet the reduction in prices on other finished forms of iron and steel have not extended to spikes, which remain at \$1.50 base, Pittsburgh, with the usual extras for odd sizes. New demand is light, and there are no large inquiries in the market.

Merchant Pipe.—No reductions in prices on iron and steel pipe were made at the steel meeting, nor was it expected that any lower prices would be made. On February 19, 1909, new discounts on merchant pipe were issued by the leading mills, showing reductions in prices of \$8 to \$12 a ton on the various sizes. So far only \$2 a ton of this reduction has been restored, so that it can be said that prices on pipe are reasonably low, and new demand would not have been stimulated by a further reduction. A fair amount of new business is being placed in merchant pipe right along, and actual orders received by the mills in May show a slight increase over April. No important contracts for line pipe were placed in the past week, but several large jobs are being figured on, one for piping natural gas from the West Virginia gas fields to Detroit, Mich., requiring a very large tonnage of pipe, and which may be placed at any time.

Boiler Tubes.—The boiler tube trade is very dull, new demand being light, and specifications against contracts unsatisfactory. It is stated that discounts on both iron and steel boiler tubes are being more or less shaded.

Coke.—There is no improvement in coke either in demand or prices. Most of the blast furnace interests are covered by contract, while several consumers of furnace coke that are not covered are buying from hand to mouth. The output of coke is being steadily decreased and is now smaller than at any time for the past several years. The output of the Upper and Lower Connellsville regions last week was 273,108 tons, a decrease over the previous week of 5000 tons. We quote standard makes of furnace coke for June shipment at \$1.50 to \$1.55 per net ton at oven, and for delivery over the second half of the year at \$1.75 to \$1.85. We quote standard makes of 72-hour foundry coke at \$1.75 to \$1.90 for June shipment, and from \$2.10 up to \$2.40 to consumers, per net ton at oven, for delivery over the second half of the year. Some makes of both furnace and foundry coke have sold for prompt shipment at somewhat under the above prices.

Iron and Steel Scrap.—The recent flurry in scrap seems to be pretty well over, and new buying has quieted down. The reductions in prices on finished iron and steel products, which may extend also to pig iron, will no doubt be felt in scrap, and will probably prevent for the time being at least any advance in prices. New buying by consumers is light, and no important sales of scrap have been made in the past week. Deal-

THE IRON AND METAL MARKETS

ers are quoting, per gross ton, Pittsburgh, about as follows:

Heavy steel scrap, Steubenville, Follansbee, Sharon	
Monessen and Pittsburgh delivery.....	\$13.00 to \$13.25
No. 1 foundry cast.....	13.50 to 13.75
No. 2 foundry cast.....	12.50 to 12.75
Bundled sheet scrap, at point of shipment.....	9.75 to 10.00
Re-rolling rails, Newark and Cambridge, Ohio, and Cumberland, Md.....	13.50 to 13.75
No. 1 railroad malleable stock.....	12.00
Grate bars.....	10.50 to 10.75
Low phosphorus melting stock.....	16.50 to 16.75
Iron car axles.....	24.25 to 24.50
Steel car axles.....	18.50 to 18.75
Locomotive axles.....	23.00
No. 1 busheling scrap.....	12.00 to 12.25
No. 2 busheling scrap.....	8.50 to 8.75
Old car wheels.....	13.50 to 13.75
Sheet bar crop ends.....	15.50 to 15.75
*Cast iron borings.....	9.00 to 9.15
*Machine shop turnings.....	9.15 to 9.25
Old iron rails.....	15.00 to 15.25
No. 1 wrought scrap.....	14.25 to 14.50
Heavy steel axle turnings.....	10.25
Stove plate.....	10.50 to 10.75

*These prices are f.o.b. cars at consumers' mill in the Pittsburgh district.

Chicago

FISHER BUILDING, May 29, 1911.

Pig Iron.—The recent cut in the price of steel bars has unsettled conditions and some of the pig iron inquiries of last week have been withdrawn. Southern iron is being sold in this district at \$10.50, Birmingham, for No. 2 Southern. Such quotations have become common for third quarter delivery. Buyers are asking for this price on fourth quarter and first quarter deliveries, but there is an indisposition on the part of some furnaces to make such quotation on later deliveries. Under the stimulus of price reductions several sales of Lake Superior charcoal have been made. The following quotations are for Chicago delivery, with the exception of Northern irons, which are now quoted f.o.b. furnace:

Lake Superior charcoal.....	\$17.00
Northern coke foundry, No. 1.....	15.50
Northern coke foundry, No. 2.....	15.00
Northern coke foundry, No. 3.....	14.75
Northern Scotch, No. 1.....	16.00
Southern coke, No. 1 foundry and No. 1 soft.....	15.35
Southern coke, No. 2 foundry and No. 2 soft.....	14.85
Southern coke, No. 3.....	14.60
Southern coke, No. 4.....	14.35
Southern gray forge.....	14.60
Southern mottled.....	14.60
Malleable Bessemer.....	15.00
Standard Bessemer.....	17.40
Basic.....	15.50
Jackson Co. and Kentucky silvery, 6%.....	17.90
Jackson Co. and Kentucky silvery, 8%.....	18.90
Jackson Co. and Kentucky silvery, 10%.....	19.90

Structural Material.—This has been one of the most active years in building structurals in the Chicago territory and the tonnage of steel consumed in such work has been enormous. The Mallers building, Chicago, is the largest letting this week, adding materially to the already enormous tonnage consumed by Chicago buildings this year. The contract for this building was awarded to the Hansell-Elcock Company and the South Halsted Street Iron Works, both of Chicago, and the building will consume 4000 tons of material. Other contracts awarded include the steel work for remodeling Section No. 55, Western Electric Company's building at Hawthorne, Ill., 363 tons, Vierling Steel Company, Chicago; post office building, Roswell, N. M., 104 tons; crane runway for Haskell-Barker Car Company, Michigan City, Ind., 160 tons, let to Lackawanna Bridge Company; producer building for reheating furnaces, Minnesota Steel Company, New Duluth, Minn., 200 tons, let to American Bridge Company; Hamilton Club building, Chicago, 1178 tons, let to Toledo Bridge & Crane Company; bridge to carry pipe line across Nisqually River, Tacoma, Wash., 274 tons, let to American Bridge Company; Escanaba & Lake Superior Railroad Company, bridge, 100 tons; reheating furnace building and billet storage, Minnesota Steel Company, New Duluth, Minn., 550 tons, let to American Bridge Company. We quote plain material from mill at 1.58c. to 1.63c., Chicago; from store, 1.80c. to 1.90c., Chicago.

Rails and Track Supplies.—Specifications against standing contracts have been very good this week and the leading interest has sold 10,000 tons standard sections. A large tonnage of standard sections is afloat and probably will be closed in the near future. Light rails business is very satisfactory and track supplies are

holding up well. We quote standard railroad spikes at 1.65c. to 1.75c., base; track bolts with square nuts, 2.15c. to 2.25c., base, all in carload lots, Chicago. Standard section Bessemer rails, 1.28c.; open hearth, 1.34c.; light rails, 40 to 45 lb., 1.16c. to 1.20½c.; 30 to 35 lb., 1.10½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12 lb., 1.25c. to 1.30½c., Chicago.

Plates.—Plate mills are running at little less than two-thirds capacity with but a comparatively small amount of business in sight. The Cincinnati, New Orleans & Texas railway has placed an order for 1000 cars with the American Car & Foundry Company. Principal producers are maintaining Chicago mill prices at 1.58c. to 1.63c.; store prices, 1.80c. to 1.90c., Chicago.

Sheets.—Extreme quietness is affecting the entire sheet market. Mills are operating at about 50 per cent. of their capacity, with practically no business booked ahead. There is a further tendency of price weakening, accelerated by the reduction in the price of steel bars. Store sales are extremely quiet, and purchasers of all kinds are very evidently sailing close to the wind. Chicago prices are as follows: Carload lots, from mill: No. 28 black sheets, 2.38c.; No. 28 galvanized, 3.38c.; No. 10 blue annealed, 1.83c. Prices from store, Chicago, are: No. 10, 2.10c. to 2.20c.; No. 12, 2.15c. to 2.25c.; No. 28 black, 2.75c. to 2.85c.; No. 28 galvanized, 3.65c. to 3.75c.

Bars.—Stimulated by a reduction in the price of soft steel bars, business has been better in this line. Some buyers had anticipated this reduction and are now placing orders quite freely. The Republic Iron & Steel Company, a strong factor in the bar trade of this territory, was first to make the reduction, but was quickly followed by other mills. We quote as follows: f.o.b. Chicago: Soft steel bars, 1.43c.; bar iron, 1.20c. to 1.25c.; hard steel bars, rolled from old rails, 1.22½c. to 1.27½c. From store, soft steel bars, 1.70c. to 1.80c., Chicago.

Billets.—Practically all the billet business that is being closed in this market is for carload lots evidently going into immediate consumption. The recent price reduction in some of the finished products has led prospective buyers into the belief that lower figures will soon be named on billets. Most business being closed in this market is at prices ranging from \$28 to \$30.60, base, Chicago, on open hearth forging billets. Lower prices are known to have been made but it is presumed that the billets in such transactions were a little off color. We continue to quote \$25.60, base, Chicago, on re-rolling billets. The leading interest is maintaining its price of \$30.60, base, Chicago on open hearth forging billets.

Wire Products.—Barb and fence wire are leading the list of active items in wire products. The sale of barb wire and woven fencing is holding up remarkably well as the season advances. Mills have gained upon orders until now they are making prompt shipments. Prices are unchanged as follows: Jobbers' carload prices, which are quoted to manufacturing buyers, are as follows: Plain wire No. 9 and coarser, base, 1.78c.; wire nails, 1.98c.; painted barb wire, 1.98c.; galvanized, 2.28c.; polished staples, 1.98c.; galvanized, 2.28c., all Chicago.

Cast-Iron Pipe.—Inquiry for various kinds of cast-iron pipe has been fairly free during the week and specifications against contracts have been good. There has been practically nothing doing in the way of railroad purchases, although numerous needs of this nature are known to exist. Municipal buying has been very satisfactory. Among the principal purchasers were Bay City, Mich., 300 tons; La Crosse, Wis., 1200 tons, and St. Louis, Mo., 3000 tons, this business having been closed by the principal producer. Gas business is very fair for this season. Prices are firm as follows, per net ton, Chicago: Water pipe, 4 in., \$25.50; 6 to 12 in., \$24.50; 16 in. and up, \$24, with \$1 extra for gas pipe.

Old Material.—The Chicago scrap market has been extremely quiet. Prices are practically unchanged. The Illinois Central Railroad is out with a new scrap list, approximating 4000 tons, which closes July 1. The reduction in the price of bars is reported to have resulted in desirable business with important agricultural manufacturers, and as the inactivity of the scrap market the past few weeks has been largely due to the lack of business at bar mills, this may be taken as a favorable development. Prices below are for delivery to buyers' works, all freight and transfer charges paid, per gross ton:

THE IRON AND METAL MARKETS

Old iron rails.....	\$14.50 to \$15.00
Old steel rails, rerolling.....	12.25 to 12.75
Old steel rails, less than 3 ft.....	11.25 to 11.75
Relaying rails, standard sections, subject to inspection.....	23.00 to 24.00
Old car wheels.....	12.75 to 13.25
Heavy melting steel scrap.....	10.25 to 10.75
Frogs, switches and guards, cut apart.....	10.50 to 11.00
Shoveling steel.....	10.00 to 10.50
Steel axle turnings.....	8.50 to 9.00
The following quotations are per net ton:	
Iron angles and splice bars.....	\$12.25 to \$12.75
Iron arch bars and transoms.....	13.50 to 14.00
Steel angle bars.....	10.50 to 11.00
Iron car axles.....	18.00 to 18.50
Steel car axles.....	16.75 to 17.25
No. 1 railroad wrought.....	11.00 to 11.50
No. 2 railroad wrought.....	10.00 to 10.50
Steel knuckles and couplers.....	10.00 to 10.50
Locomotive tires, smooth.....	17.00 to 17.50
Machine shop turnings.....	6.25 to 6.75
Cast and mixed borings.....	5.25 to 5.75
No. 1 busheling.....	8.75 to 9.25
No. 2 busheling.....	6.75 to 7.25
No. 1 boilers, cut to sheets and rings.....	7.50 to 8.00
Boiler punchings.....	12.00 to 12.50
No. 1 cast scrap.....	10.75 to 11.25
Stove plate and light cast scrap.....	9.25 to 9.75
Railroad malleable.....	10.25 to 10.75
Agricultural malleable.....	9.25 to 9.75
Pipes and flues.....	8.00 to 8.50

Cleveland

CLEVELAND, OHIO, May 30, 1911.

Iron Ore.—Following the sale of 400,000 tons of non-Bessemer ore last week by a Cleveland firm that does not adhere to regular quotations and disposed of this tonnage at slightly below regular prices the market has been extremely quiet. No sales or inquiries for tonnages of any size are reported. The inquiry of the Bethlehem Steel Company has not yet resulted in the placing of any contracts and it hardly seems probable that this company and the lake ore firms will get together on prices. Because of the light demand for ore operations in the Lake Superior district are being curtailed heavily and no work is being done in some of the open pit properties. While a large number of lake boats have not yet been placed in commission, it is believed that there is enough vessel tonnage fitted out to move all of the ore that will be brought down this season. We quote prices as follows: Old range Bessemer, \$4.50; Mesaba Bessemer, \$4.25; Old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.50.

Pig Iron.—One local selling agency reports considerable improvement in the demand for foundry and malleable iron for shipment to Michigan and Indiana points, having during the week made several sales, the largest being for about 1000 tons. These sales were for the last half delivery. The market in this territory continues extremely dull. There is some demand for small lots of foundry iron for spot shipment, but there is practically no buying for last half requirements. Furnaces are adhering to recent quotation of \$13.75 to \$14, Cleveland and Valley furnace, for No. 2 foundry for the last half. There have been no inquiries large enough to test the market, however, since the reduction in ore prices. Southern iron is offered at \$10.50, Birmingham, for prompt shipment, but \$11 is being generally asked for the last half delivery. For early delivery we quote, delivered Cleveland, as follows:

Bessemer	\$15.90
Basic	14.00
Northern foundry, No. 2.....	14.25
Gray forge	13.50
Southern foundry, No. 2.....	\$14.85 to 15.10
Jackson Co. silvery, 8 per cent, silicon.....	17.75 to 18.00

Coke.—The only demand is for small lots of foundry grades for prompt shipment. Prices remain stationary. We quote standard Connellsville furnace coke at \$1.45 to \$1.55, per net ton at oven, for prompt shipment, and \$1.75 to \$1.85 for the last half. Connellsville 72-hour foundry coke is quoted at \$1.75 to \$2 for prompt shipment and \$2 to \$2.40 for the last half.

Finished Iron and Steel.—The uncertainty regarding prices that followed the reduction of the price of steel bars last week has caused the temporary holding up of orders for considerable tonnage in nearly all lines, consumers ordering only such material as they actually need immediately. The Republic Iron & Steel Company, which made the price reduction, has taken contracts for a fair tonnage of steel bars in this territory and reports specifications for considerable tonnage on those contracts. This company has been quite active in taking contracts on the 1.25c. basis, these contracts extending to October 1 for jobbers, January 1 for general consumers and to July 1 for the implement trade. Other mill agencies have met the price for immediate

specifications, but some of them have declined to book orders for future delivery at the new price. Makers of hard steel bars have not yet reduced their quotation of 1.20c. on rerolled bars, but they are expected to announce lower prices as soon as soft steel bars are firmly established on a new basis. The uncertain condition of prices has caused the holding off of the placing of the contract for the Y. M. C. A. building in Cleveland, for which bids had been received, and other pending structural work. No new inquiries requiring lots of any size have come out. Some car lot orders for plates are being held up until the market becomes settled. The demand for sheets is quite unsatisfactory and price concessions have become more general. Most of the business is being taken at prices ranging from \$1 to \$2 a ton below the regular quotations. Lower prices on steel bars have not yet affected prices on rivets, which have been very low for some time. Some of the bar iron mills have met the new price on steel bars by reducing their price \$1 a ton to 1.25c. The condition of the bar iron trade has been unsatisfactory for some time, the demand being light with prices \$2 a ton lower than steel. With both on the same price basis makers are not taking a very hopeful view of the situation, and intimate that a further reduction would be impossible without a wage reduction.

Old Material.—The cut in the price of steel has as yet had no effect on local scrap prices. Although the market is weak quotations are unchanged. Dealers do not look for prices to go much lower and feel that the reduction in steel may stir up some activity in the scrap market. The market has been extremely dull during the past week. Mills do not want to buy, and at present prices producers and dealers do not care to sell. Local dealers have large stocks on hand, especially in heavy steel scrap. Local mills are offering \$11 for heavy steel, but none appears to be had at that price. The Wheeling & Lake Erie and the Erie Railroads have lists out, the former to close June 1 and the latter June 2. Dealers' prices per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails, rerolling.....	\$13.00 to \$13.50
Old iron rails.....	15.00 to 15.50
Steel car axles.....	17.50 to 18.00
Heavy melting steel.....	11.00 to 11.50
Old car wheels.....	11.50 to 12.00
Relaying rails, 50 lb. and over.....	22.50 to 23.50
Agricultural malleable	10.75 to 11.00
Railroad malleable.....	11.50 to 12.00
Light bundled sheet scrap.....	7.50 to 8.00

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles.....	\$21.00 to \$21.50
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings.....	6.50 to 6.75
Steel axle turnings.....	8.00 to 8.50
No. 1 busheling.....	9.50 to 10.00
No. 1 railroad wrought.....	11.50 to 12.00
No. 1 cast.....	11.25 to 11.50
Stove plate	10.25 to 10.50
Bundled tin scrap.....	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, May 31, 1911.—(By Telegraph.)

Pig Iron.—Compared with conditions existing during April and the early part of May, the closing week of the passing month has probably developed a shade more interest. Consumers, however, appear to be only testing the market for bottom prices and are not serious about covering for last half requirements. Shipments on contracts previously made are not moving so satisfactorily as former reports indicated, and the recent price reduction instead of bringing out more business seems to have temporarily smothered it. Order books show very small tonnages lately booked and the activity reported in other markets is not reflected here. The cut in finished material prices has undoubtedly caused buyers of pig iron to hesitate about placing contracts and just at the moment local agencies do not know what to expect for the immediate future. Reports have circulated that some Southern iron for spot shipment was obtainable as low as \$10.25, but \$10.50, Birmingham, is considered the lowest quotable figure on standard brands of No. 2 foundry and several producers refuse to sell below \$11. However, it is now generally acknowledged that \$10.50 can be done for the remainder of the year with those interests that are quoting that price for immediate shipment. The lower grades are scarce and a small lot of No. 4 foundry brought \$9.75, Birmingham, for August-November shipment. Northern foundry is quiet, and, due to the softening of Southern prices, there is little disposition on

THE IRON AND METAL MARKETS

the part of Hanging Rock producers to meet that competition. A few furnaces are taking on a limited tonnage around \$13.75 for the last half, although \$14 is the regular quotation. Malleable and basic are not in demand. A small lot of Jackson County silvery was taken by an Indiana melter at the regular market price. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry.....	\$14.25 to \$14.75
Southern coke, No. 2 foundry.....	13.75 to 14.25
Southern coke, No. 3 foundry.....	13.50 to 13.75
Southern coke, No. 4 foundry.....	13.25 to 13.50
Southern coke, No. 1 soft.....	14.25 to 14.75
Southern coke, No. 2 soft.....	13.75 to 14.25
Southern gray forge.....	13.00 to 13.25
Ohio silvery, 8 per cent. silicon.....	17.45 to 17.70
Lake Superior coke, No. 1.....	15.45
Lake Superior coke, No. 2.....	14.95
Lake Superior coke, No. 3.....	14.45
Basic, Northern.....	15.20 to 15.45
Standard Southern car wheel.....	25.75 to 26.25
Lake Superior car wheel.....	19.50

(By Mail.)

Coke.—There is an inquiry reported from a Southern furnace for about 15,000 tons of 48-hour coke for delivery during the last half of this year. A number of foundries are contracting or feeling the market for prices, but there is a noticeable reduction in the quantity usually bought at this time of the year. Prices are unchanged and furnace coke is quotable between \$1.40 to \$1.65, with a few brands commanding as high as \$1.85 on yearly contracts. The prompt shipment price of foundry coke is around \$1.90 to \$2 per net ton oven in all three fields and \$2.10 to \$2.25 is usually inserted in contracts, although there are a few standard brands that are obtainable as low as \$2 for shipment throughout the next 12 months. No immediate change is anticipated.

Old Material.—Dealers complain about the absence of demand on the part of mill consumers and state that they are not buying any scrap material except when it can be obtained at very advantageous figures. The railroads do not care to accept present offers and as a consequence are selling very little material. Prices for delivery in buyers' yards, southern Ohio and Cincinnati, are as follows:

No. 1 railroad wrought, net ton.....	\$11.50 to \$12.00
Cast borings, net ton.....	4.50 to 5.00
Steel turnings, net ton.....	5.50 to 6.00
No. 1 cast scrap, net ton.....	9.75 to 10.00
Burnt scrap, net ton.....	7.00 to 7.50
Old iron axles, net ton.....	16.50 to 17.00
Bundled sheet scrap, gross ton.....	7.25 to 8.25
Old iron rails, gross ton.....	13.50 to 14.00
Relaying rails, 50 lb. and up, gross ton.....	21.00 to 22.00
Old car wheels, gross ton.....	10.75 to 11.75
Heavy melting steel scrap, gross ton.....	10.00 to 10.50

Finished Material.—The reduction in the price of steel bars does not seem to have brought out as much new business as was anticipated. The present price of 1.25c. Pittsburgh is said to be strictly maintained, and so far as this market is concerned there are no rumors of any cuts under this figure. Local warehouse quotations have not been changed materially and 1.80c. is asked for steel bars, and structural material is firm at 1.90c. The margin of profit has been so small that dealers cannot afford to accept any lower prices, especially on stocks already acquired at previous market quotations. Local dealers report business as being very quiet, and state their customers are hesitating about placing orders now for anything except immediate requirements, preferring to wait and see if the market will go lower.

Philadelphia

PHILADELPHIA, Pa., May 30, 1911.

The question of prices and their future possibilities have been all absorbing topics in the market. Concessions made in Virginia foundry iron prices have resulted in further sales, but as the lower level has not been generally met by other producers consumers are awaiting developments. The reduction in steel bars last week caused considerable interest in the finished material market, but did not stimulate buying to any appreciable extent. Just how low producers will go to get business does not seem to be fully determined. The action of the meeting in New York in meeting the recent cut of the Republic Iron & Steel Company and extending reductions to plates, shapes, billets, sheet bars and sheets was not unexpected, but because of the holiday immediately following the announcement it

will probably be a day or two before the announcement of the various individual manufacturers are given to the trade. In the meantime buyers, while making a few inquiries to test the market, are withholding, if possible, the actual placing of orders. An air of hesitancy is to be noted throughout the trade.

Iron Ore.—Business is at a standstill, although it is understood that negotiations are under way in connection with the exercising of certain options in foreign ore, which were given earlier in the year. Importations at this port during the week ending May 27 included 24,580 tons of Newfoundland, 11,871 tons of Swedish, 5800 tons of Cuban and 5336 tons of Spanish ore.

Pig Iron.—Transactions have again been largely confined to Virginia foundry grades. The leading interest in that district has made further sales in this territory, aggregating several thousand tons, the bulk of which was for early and third quarter delivery at prices equal to \$15.05 to \$15.25, delivered here. Another Virginia producer, who has not been willing to meet the low level made by the Virginia C. I. & C. Co., has sold 1000 tons for delivery extending up to the end of the third quarter at \$12.50, furnace, equal to a spread of \$15.30 to \$15.50, delivered here, according to the route of shipment. What other producers will finally decide to do is still an open question. Those in eastern Pennsylvania have so far not made concessions and contend that they will hold the present level of \$15.50 to \$15.75 for No. 2 X foundry, delivered in this vicinity. The situation has, however, not been very thoroughly tested, as consumers are not in urgent need of iron and are disposed to await some further adjustment of prices before coming into the market. Under the circumstances the movement in eastern Pennsylvania iron has been practically at a standstill. The cast iron pipe makers have not been inquiring very freely for low grade irons, confining purchases to small and cheap odd lots. Forge iron continues inactive and is quoted nominally at \$14.75 to \$15, delivered. No further sales of basic iron have come out. Consumers in the East are pretty well covered as far as immediate and third quarter needs are concerned, but would consider purchases for fourth quarter shipment, for which sellers do not appear to be willing to quote. Negotiations are said to be still pending for a round lot of low phosphorus iron, but outside of small sales at \$21, delivered here, for standard brands no business is reported. The general range of prices for standard brands, for delivery usually running up to the end of the third quarter, in buyers' yards in this district, is about as follows:

Eastern Pennsylvania No. 2 X foundry....	\$15.50 to \$15.75
Eastern Pennsylvania No. 2 plain.....	15.00 to 15.25
Virginia foundry.....	15.05 to 15.50
Gray forge.....	14.75 to 15.00
Basic.....	14.50 to 15.00
Standard low phosphorus.....	21.00

Ferromanganese.—Buying in this district is practically at a standstill, nominal quotations for 80 per cent. ferro being \$36.50 to \$37, Baltimore.

Billets.—A slight accumulation of orders during the idleness of some of the mills week before last has enabled them to run steadily during the past week. Makers report about the usual run of small orders for prompt shipment, with an absence of any inquiry for any large quantities for extended deliveries. Open hearth rolling billets as a result of the New York meeting are quoted at \$23.40 and ordinary forging billets at \$28.40, delivered here.

Plates.—Makers report a very fair run of orders, particularly for tank, bridge and locomotive work, and mill operations continue on a fairly even basis. No official announcement of price changes has been made in this territory, but with the resumption of business after the holiday all makers will undoubtedly make their quotation on the basis of 1.50c. for ordinary plates, delivered in this vicinity.

Structural Material.—With the general contract for the Fire Association of Philadelphia building placed it is now expected that contracts for the structural steel work will shortly be placed. Fabricators are also looking forward to a considerable quantity of material for a proposed million dollar hotel in Wilmington, Del., in which the Dupont company is said to be interested. A fair volume of moderate lot business is pending, while the demand for plain shapes is about on an even basis. The reduction of \$1 per ton will undoubtedly become effective, making the 1.50c. base for plain shapes, delivered in this vicinity.

Sheets.—The current demand has been somewhat better and the urgency with which buyers ask for de-

THE IRON AND METAL MARKETS

liveries indicates how meagre stocks are being carried. While the demand is still irregular orders have averaged a better aggregate tonnage and mills have been more fully engaged during the past week. Because of the intervening holiday the action of the New York meeting has not been officially ratified, but it is understood a general reduction to the basis of 2.70c. for No. 28 gauge will prevail on all new business for delivery before October.

Bars.—Announced reductions in the price of steel bars by one of the leading independent mills has broken the market for that class of bars. From the recent nominal price 1.55c., delivered here, quotations were cut to 1.40c., delivered, and it is believed that in close competition that price could be still further shaded. While there has been considerable inquiry for the purpose of testing the market no heavy purchases have been reported by consumers in this district. The reduction in the price of steel bars has caused further hesitancy to be shown in the demand for refined iron bars, which are quoted at 1.27c. to 1.35c., delivered here.

Coke.—The market continues quiet. Occasional small lots of foundry coke are moved at unchanged prices. Negotiations are under way for a few fair lots, but the demand is not active. Foundry grades are quoted from \$2 for prompt to \$2.40 at oven for forward delivery. No particular movement in furnace coke is reported. Quotations remain at about \$1.50 at oven for spot and \$1.70 to \$1.80 for forward shipment. The following range is named per net ton for deliveries in buyers' yards in this district:

Connellsville furnace coke.....	\$3.70 to \$4.05
Foundry coke	4.15 to 4.55
Mountain furnace coke	3.30 to 3.65
Foundry coke	3.75 to 4.15

Old Material.—While the market is sentimentally better the volume of business transacted shows little change and prices remain at about the same level. Heavy steel melters would take round lots of No. 1 melting steel at about the market, but sellers refuse to dispose of any quantity at the present level. Rolling mill grades show little movement and there is almost an entire absence of business special grades. Quotations are largely nominal, the following range about representing sellers' ideas for small lots, delivered in buyers' yards, eastern Pennsylvania and nearby points, carrying a freight rate from Philadelphia ranging from 35c. to \$1.35 per gross ton:

No. 1 heavy melting steel scrap.....	\$13.00 to \$13.25
Old steel rails, rerolling.....	14.00 to 14.25*
Low phosphorus heavy melting steel scrap..	16.75 to 17.25
Old steel axles.....	19.25 to 19.75*
Old iron axles.....	24.00 to 24.50
Old iron rails.....	16.75 to 17.25
Old car wheels.....	13.00 to 13.50
No. 1 railroad wrought.....	15.00 to 15.50
Wrought iron pipe.....	12.50 to 12.75
No. 1 forge fire.....	10.50 to 11.00
No. 2 light iron.....	7.00 to 7.50*
Wrought turnings	8.25 to 8.75
Cast borings	7.75 to 8.25
Machinery cast	13.00 to 13.50
Railroad malleable	11.50 to 12.00
Grate bars, railroad.....	10.50 to 11.00
Stove plate	10.00 to 10.50

*Nominal.

Birmingham

BIRMINGHAM, ALA., May 29, 1911.

Pig Iron.—No new developments can be reported in the pig iron market, except that there is perhaps a little less inquiry before the trade this week than there was ten days ago, due evidently to the feeling of more or less uncertainty regarding the outcome of the cut in certain lines of steel. It had been generally concluded that with the coming of the month of June and the winding up of the first half year's business there would be a more pronounced disposition to consider the placing of orders for liberal tonnages of pig iron. And it is still felt that if there is developed a degree of stability in steel prices, even at materially lower figures, buying will begin on a good scale in finished lines and that pig iron will feel a corresponding impulse. It is argued that the cut to \$10.50 Birmingham puts pig iron as low as it can well afford to be sold and that the cut in steel bars, for instances, had already been discounted by the pig iron makers. Undoubtedly any cut below \$10.50 Birmingham for No. 2 pig iron would mean a still further decrease in production, and inasmuch as shipments are still going forward at a fair rate from furnace yards it would certainly require a great deal of pressure to shade the figures that have been established

for prompt delivery, as well as last half shipment. There is no change in the labor scales in this district, and if pig iron should decline further it is pretty certain that such course of the market would force a reduction in the price for mining coal, with corresponding shrinkage of the wage scale all along the line. Quotations remain unchanged as follows for second and third quarter shipment,

No. 1 foundry and No. 1 soft.....	\$11.00
No. 2 foundry and No. 2 soft.....	10.50
No. 3 foundry.....	10.00
No. 4 foundry.....	9.75
Gray forge	9.50
Mottled	9.25
Standard basic, chill cast.....	10.50
"Off basic"	10.00
Charcoal carwheel iron.....	22.50

these figures all being per ton of 2240 lb. f.o.b. cars furnace yards.

Cast Iron Pipe.—Few large contracts have been added to the unfilled orders for the past week; still shipments are very good and prices very firmly established. Large shipments are going out daily to New Orleans and to California. There is no increase in stocks, and so long as this satisfactory showing is made there will certainly be no cut in prices. Quotations are per net ton, f.o.b. foundries here, as follows: 4 to 6 in., \$22.50; 8 to 12 in., \$22; over 12 in., average, \$21, with the usual differential of \$1 more for gas pipe.

Old Material.—Some fair sales appear to have been made during the week just closed, and without any material concession in the scale of values that has obtained for many weeks. Dealers continue to pick up odd lots from the country when offered at bargain figures. As a general proposition it is expected that the summer months will prove rather dull in the local scrap market, this line reflecting to a marked degree the condition of the pig iron market. Quotations remain nominally as follows, per gross ton, f.o.b. car, dealers' yards here:

Old iron axles (light).....	\$14.50 to \$15.00
Old steel axles (light).....	13.50 to 14.00
Old iron rails	13.00 to 13.50
No. 1 railroad wrought.....	12.00 to 12.50
No. 2 railroad wrought.....	10.50 to 11.00
No. 1 country wrought.....	8.00 to 8.50
No. 2 country wrought.....	7.50 to 8.00
No. 1 machinery.....	10.50 to 11.00
No. 1 steel.....	9.50 to 10.00
Tram car wheels.....	9.00 to 9.50
Standard car wheels.....	10.50 to 11.50
Light cast and stove plate.....	8.00 to 8.50

Coal and Coke.—Considerable interest has been shown the past week in some important contracts that are pending for the next year's coke requirements, particularly in the case of two gas companies that use 48-hour furnace coke, which product has been experiencing very slow sale for some months, owing to the inactivity of the larger percentage of furnace stacks in Alabama. One contract for furnace coke to the extent of 100 tons per day was closed last week, but the exact figures are not available, which leads to the conclusion that an attractive price must have been named the consumer. Some good shipments of foundry coke are going forward regularly from Alabama ovens to the Pacific slope, and on this particular business fair prices are being obtained, as the next competition comes from Virginia and Connellsville ovens, from which points the freight rates are much higher. Coal continues very dull, with prospects of but few large contracts being closed before the fall months, buyers seemingly preferring to cover only from week to week, with the hope of gradually forcing prices down. Meanwhile if the price for mining coal should be cut 5c. per ton this would mean a reduction of say 10c. per ton in the selling price, and this possibility is also having its effect on the matter of closing contracts.

The German Iron Market

BERLIN, May 19.

News from the iron trade for a week has been meagre and what has come in has been mostly of a rather unfavorable nature. The works united in the band-iron convention have this week adopted a price reduction of 2.50 marks against the independent concerns, whose competition has latterly grown sharper. At the meeting which took this action it was mentioned that the market situation for this specialty is in a state of confusion. The gas-pipe association, organized last year by a number of works after the general piping syndicate was dissolved, has this week also gone

THE IRON AND METAL MARKETS

to pieces. It is held in some quarters that this improves the prospects for a reorganization of the old syndicate, notwithstanding the fact that the great Mannesmann Company has announced its intention to remain independent.

From the Saar district a good demand for nearly all forms of iron and steel is reported this week, and all the works there are fully employed. It is admitted, however, that in the case of bars the quoted prices do not correspond to the actual market prices. Reports from other sections of the country indicate that 102 marks is now about the price for bars for home delivery, and 92 to 93 for export. This latter price does not leave a profit to many of the rolling mills not belonging to the great mixed companies.

Indeed, the complaints about unsatisfactory prices, especially for the foreign markets, are growing more general. Works in some sections of the trade are losing money on a part of their export business. This appears to be the case with wire and wire nails. Here, again, it is chiefly the disconnected concerns that are suffering. They buy their wire rods from the union at 130 marks, whereas wire nails can be bought in England at 120 marks. True, the German mills receive a drawback of 20 marks on exported goods, but even so there is a difference of only 10 marks between costs of material and export price—not enough to pay expenses of manufacture and sale. Hence the unattached wire mills have for some time kept aloof from foreign business. It is asserted that even the big mixed concerns, which are still selling wire and wire nails abroad, are doing so at a loss, keeping up their trade in order not to lose their business connections. The only favorable news from the trade this week refers to the state of business in castings, which is reported to be very active. This is especially the case with columns for structural purposes, which have been greatly stimulated by the revival in the building trade. An advance of 2 marks per metric cwt. has been recently made.

News from the Belgian trade this week is again less satisfactory. A further reduction in the export price of basic steel and wrought iron bars from 92s. 6d. to 94s. to 91s. 6d. to 92s. per ton f.o.b. Antwerp has just been made.

The most interesting foreign venture for obtaining ore supplies reported in the German iron trade for some years is that of the great establishment, *Gewerkschaft Deutscher Kaiser*, owned by the Rhenish coal and iron magnate, August Thyssen. He made a contract two years ago for about 2,375,000 tons of Russian ore, to be shipped from Nikolajeff during the next six or eight years. The most highly improved facilities for handling the ores at that port have been in the meantime erected and shipments have already begun.

According to a Russian newspaper the Krupp company, which has for some time operated a small arms factory near Riga, is about to add a cannon factory to its plant.

Buffalo

BUFFALO, N. Y., May 29, 1911.

Pig Iron.—Holiday observance and the restraining effect of the unsettled condition in bar products has combined to exercise a quieting influence on the week's trade; but notwithstanding this a fair amount of business has been done. Inquiry for malleable and foundry irons aggregating about 12,000 tons has been received and the new business booked so far as reported totaled about 7000 tons in all grades, principally for third quarter delivery. Business taken was largely at prices slightly under schedules previously ruling. The inquiries received included several of pretty good sized tonnages from New England and New York state points for malleable and foundry grades; one from a Troy concern for 1000 tons foundry grades and one from Connecticut for a large tonnage of malleable. The belief is gaining ground that orders from railway sources will come in more freely after July 1. A serious break in the Erie Canal east of Rochester is holding back canal shipment of pig iron, as repairs to the break will require until July 15 for completion. For second and third quarter delivery we quote as follows, f.o.b. Buffalo:

No. 1X foundry.....	\$14.00 to \$14.50
No. 2X foundry.....	13.75 to 14.00
No. 2 plain.....	13.50 to 13.75
No. 3 foundry.....	13.25 to 13.50
Gray forge	13.00 to 13.25
Malleable	13.75 to 14.25
Basic	14.00 to 14.75
Charcoal	16.50 to 17.25

Finished Iron and Steel.—All agencies are meeting the 1.25c. price on steel bars and all material on the bar card made by the Republic Iron & Steel Company, but the cut made by that company has not apparently had a stimulating effect in inducing placement of new business, producing instead a feeling of uncertainty and uneasiness which retards placement in other lines. No change has been made in the price of plates and structural shapes, but during the last day or two many quotations have been held open awaiting the outcome of the meeting of the steel makers, which is being held in New York to-day. The Canadian export trade, which has been of good volume in bar products, has halted to some extent in the last few days, owing to the price situation. In structural material some jobs about to be placed have been held up temporarily. Some of the general contractors on the Erie Canal construction contracts are receiving figures for subcontracts for the steel work required. Bids are soon to be received for the third building of the new lithographing plant of the Huebner-Bleistein Patents Company, Buffalo, requiring a considerable tonnage. The Lackawanna Bridge Company was low bidder last week for the 17-story office building of the Buffalo General Electric Company, but the contract has not yet been awarded.

Old Material.—The market continues very dull and the only transactions noted are by dealers who are taking on some stocks where obtainable at bargain prices. Consumers are still holding off on new purchases, apparently having sufficient stock on hand to meet present and immediate future requirements. Prices remain the same as for the past week or two. We quote as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel.....	\$11.50 to \$12.00
Low phosphorus steel.....	14.00 to 14.50
No. 1 railroad wrought.....	13.25 to 13.50
No. 1 railroad and machinery cast scrap.....	12.75 to 13.25
Old steel axles.....	18.00 to 18.50
Old iron axles.....	22.00 to 22.50
Old car wheels.....	12.50 to 13.00
Railroad malleable	11.00 to 11.50
Boiler plate	9.50 to 10.00
Locomotive grate bars.....	10.00 to 10.25
Pipe	9.00 to 9.25
Wrought iron and soft steel turnings.....	6.25 to 6.75
Clean cast forgings.....	6.00 to 6.25

San Francisco

SAN FRANCISCO, May 23, 1911.

The demand for finished products is still confined to narrow limits, conditions in general remaining about the same as for some time past. Local interests have little hope of any marked improvement during the summer, though inquiries are gradually increasing in some lines. The principal purchases of late have been for large development projects, and a number of large orders of this nature are still in prospect, though many large consumers are limiting their purchases as closely as possible, and the small trade is very slow to revive. Merchants are carrying large supplies, which, in view of the continued dullness, are becoming burdensome. A fair tonnage of structural material has been placed recently and several important deals are pending. The movement of cast iron pipe is satisfactory and there is some prospect of an increasing demand for plates.

Bars.—Local merchants have been carrying heavy stocks since the first of the year, and while a little more demand is noted in a small way the material is not moving off as fast as is desired. Apparently some of the larger consumers who have formerly patronized the jobbers are buying direct from the mills, though in any case the quantities taken are below normal. Few orders are being placed for foreign material, though a considerable tonnage is arriving from time to time on old orders. Reinforcing material is a prominent feature of the market and a well sustained demand is expected in this line. Aside from the requirements of local buildings, which will be of considerable importance, the Spring Valley Water Company will require a large amount of material for a concrete dam in Alameda county. The market is still rather easy, and while quotations remain at 2.00c. for steel and 1.90c. for iron concessions are obtained with little difficulty.

Structural Material.—The lowest bid on steel work for the Oakland City Hall was that of the Judson Mfg. Company of that city, the McClintic-Marshall Construction Company being second. Bids for the entire structure were largely in excess of the amount available and may have to be refigured, though no definite announcement to this effect has been made. An award on the Masonic Temple in this city is expected early next month. Aside from these jobs, considerable

THE IRON AND METAL MARKETS

small work has been let recently, and with a fair demand in other cities the total tonnage booked for Coast delivery is fairly large. A tendency to erect buildings of a more permanent nature is noted in the smaller towns, giving rise to numerous small inquiries. Many Eastern fabricators are now looking for work in this market and are getting a fair tonnage through the country, though in San Francisco local shops are taking most of the business. The building for the Bankers' Investment Company, one of the largest of the new projects here, will be up for figuring shortly, and figures are being taken on the San Francisco Investment Corporation's building at Sutter and Montgomery streets, requiring about 300 tons. The McClintic-Marshall Construction Company has taken a 60-ton job at Klamath Falls, Ore. The Finch Jail Building Company has taken a contract for steel work and cells in a jail at Susanville, Cal. Dyer Bros. have taken a small job for E. Blanique on Geary street, near Taylor, this city. The time allowed for figuring on the new Southern Pacific station at Sixteenth street, Oakland, has been extended to next month.

Rails.—The movement of both light and standard rails is rather small at the moment, though some business is coming from street railroad and interurban lines in various parts of the State, and inquiries for a very fair tonnage are in prospect. About a dozen interurban prospects are under consideration in California, and while the majority seem to lack financial support a few are likely to be carried out in the near future. The Clear Lake Railroad Company is a new concern incorporated at \$500,000, to build a line from Hopland to Lakeport, Cal. A new street road is projected at Marysville, Cal., and it is reported that the Southern Pacific will soon start work on its suburban lines near San Jose, Cal. The Pennsylvania Steel Company has taken a new contract for special work on the local Geary street road, amounting to \$45,713. The Spring Valley Water Company has signed a contract for about 1500 hp. of electric current for traction between the Southern Pacific line and the Calaveras dam site, about 8 miles, and will soon be in the market for the rails.

Sheets.—Several of the local merchants are in the market in a small way, and the general jobbing movement is rather more active than last month, though on the whole business is still quiet.

Plates.—No transactions of great importance have been closed recently, though there are several substantial inquiries in prospect for the near future. Small tanks are in quite active demand, and a number of new gas plants are projected for towns in northern California and Oregon. A large tonnage will probably be required by the Standard Oil Company within the next few months. This company is preparing to put up some new storage tanks at Antioch, Cal., and has received bids on a number of tools for plate work, supposedly in connection with a large refining plant to be erected near Los Angeles. Comparatively little business is coming from other oil interests at present. The city of Los Angeles will take bids May 26 for 4300 tons of siphons.

Merchant Pipe.—The jobbing movement is still below normal, and while merchants are coming into the market to some extent the tonnage required is small. Considerable steel pipe is being taken for water works and several new gas projects are using high-pressure steel pipe instead of cast iron, but the total tonnage for such purposes makes a poor showing as compared with the oil pipe business of the last few years. The oil interests are now keeping out of the market almost entirely, many wells which were started a few months ago being practically abandoned.

Cast Iron Pipe.—Aside from an order for 1500 tons placed by the city of Portland, Ore., no business has resulted from the more important inquiries on the Coast, the opening of bids on 8000 tons for San Diego having been postponed to May 29. The Union Water Company, Alameda, Cal., is figuring on a lot of pipe, but is not yet ready to place its order. The movement, however, is fairly active in a small way, many water and gas companies on the Coast being in the market. The city of San Francisco will soon be ready to receive 1000 tons more for its fire protection system. A lot of special castings, 42 and 60-in. diameter, will soon be required for the intake and release of the Mare Island, Cal., drydock.

Pig Iron.—The requirements of the foundry trade here have remained at a low level for many months, and there is no present indication of improvement. Prices on foreign foundry iron are very irregular and

hardly worth quoting. Southern foundry iron is nominally valued at \$21 and very little foreign material of similar grade can be sold above this figure.

Old Material.—Prices appear to have reached their lowest level for the time being as the principal offerings are now controlled by dealers and there is no particular pressure to sell. The demand is still limited, but conditions are favorable for a more active movement within the next few months. Prices are quoted as follows: Cast iron scrap, per gross ton, \$16; steel melting scrap, per gross ton, \$10.50 to \$11; wrought scrap, per net ton, \$11 to \$15; rerolling rails, per net ton, \$11.

St. Louis

St. Louis, Mo., May 29, 1911.

The market here shows more of a waiting disposition than anything else in all branches. The dullness is not of a character to indicate any material concessions in prices, but rather is a reflection of the summer dullness which may rationally be expected to have an effect about this time. Basically there is really a good feeling in that better conditions are expected to materialize before very long as a consequence of the very apparent evidence that there is no tangible foundation for a pessimistic view of the future.

Pig Iron.—This market is rather unsettled, as buyers are very evidently inclined to await the outcome of the present situation in the finished steel market. It is seemingly drifting here, as elsewhere, and consequently quiet. While there are no inquiries of importance at present there is nevertheless an anticipation of a buying movement within the next week or ten days. Some buyers make the assertion that they can get Birmingham No. 2, shipment the balance of the year, at \$10.50, but most of the furnacemen say that \$11 is still the price to be reckoned with. There have been perhaps a few more requisitions during the last few days than was the case a week ago, but as a whole they have been about on the same level as for the past three or four months. The price shows no change and the total sales for the week may be regarded as practically negligible so far as making a market is concerned. The figure for No. 2 Northern foundry iron shows no change from the \$14 last quoted with \$14.50 as the top, either for shipment to July 1 or last half, Ironton, Ohio, basis. For malleable Bessemer the same figures apply for the corresponding deliveries.

Coke.—The comparative lack of inquiry for coke for prompt shipment the past week has left the market quotations somewhat lifeless, but there have been no concessions from the figures given hitherto, namely \$2 to \$2.50 per net ton, at the oven, for 72-hour selected foundry, Connellsville or Stonega. One feature of the week, however, has been the development of a great deal of inquiry for prices for the second half of the year and some for the full year to July 1, 1912, evidencing a growing tendency to make the annual contracts on the basis of the June prices, which are always the lowest of the year.

Finished Iron and Steel.—The developments in the demand for structural steel seemingly indicate a disposition on the part of the buyers, because of the recent developments in the steel bar market, to draw out of the market. While this has been the case for several days, nevertheless the fact that they have considerable work on hand leaves little doubt that it will not be long until they are again placing orders in the market. Certainly they will as soon as the situation is settled. The Westlake Construction Company closed contracts the past week for the structural steel for the General Hospital at Cincinnati, between 600 and 700 tons. Of plates it can only be said that the market is unsteady, with no change in prices. In bars the reduced price recently made has been received with varied comment and it has been in effect such a short time that it is impossible to anticipate what action the market will take. Buyers generally are only purchasing for immediate wants and contracts will hardly be placed until the market is more settled. There have been several inquiries in the market for a fair tonnage of standard rails, the Missouri Pacific asking for figures on 40,000 tons for delivery during the summer months. Track fastenings are in fair demand and prices are firm. In light rails the demand has slackened somewhat, due to the approaching summer tendencies. A number of Illinois mines, however, are equipping with electric haulage which represents about the only demand of the present time.

THE IRON AND METAL MARKETS

Old Material.—Scrap iron is very dull at present and dealers do not anticipate anything good in the near future. The trade is simply awaiting developments and there is only a speculative trading. There are no consumers except at prices too low to enable the closing of sales, and as a rule there is a disposition to refrain from buying because the agitation in the steel market justifies apparently the playing of a waiting game. The Missouri Pacific list out to-day approximates 2000 tons. Those from the other railroads will follow later in the week, but there is no forecast as to their amount. The dealers' prices, per gross ton, f.o.b. St. Louis, are as follows:

Old iron rails.....	\$12.50 to \$13.00
Old steel rails, rerolling.....	11.25 to 11.75
Old steel rails, less than 3 feet.....	10.25 to 10.75
Rerolling rails, standard section, subject to inspection.....	23.00 to 23.50
Old car wheels.....	12.00 to 12.50
Heavy melting steel scrap.....	10.25 to 10.75
Frogs, switches and guards, cut apart.....	10.25 to 10.75

The following quotations are per net ton:

Iron fish plates.....	\$10.25 to \$10.75
Iron car axles.....	17.50 to 18.00
Steel car axles.....	17.00 to 17.50
No. 1 railroad wrought.....	10.25 to 10.75
No. 2 railroad wrought.....	9.25 to 9.75
Railway springs.....	9.00 to 9.50
Locomotive tires, smooth.....	15.50 to 16.00
No. 1 dealers' forge.....	8.50 to 9.00
Mixed borings.....	4.50 to 5.00
No. 1 busheling.....	8.50 to 9.00
No. 1 boilers, cut to sheets and rings.....	7.25 to 7.75
No. 1 cast scrap.....	9.50 to 10.00
Stove plate and light cast scrap.....	8.00 to 8.50
Railroad malleable.....	8.00 to 8.50
Agricultural malleable.....	7.00 to 7.50
Pipes and flues.....	7.25 to 7.75
Railroad sheet and tank scrap.....	7.25 to 7.75
Railroad grate bars.....	7.50 to 8.00
Machine shop turnings.....	6.00 to 6.50

New York

NEW YORK, May 31, 1911.

Pig Iron.—The activity induced by price concessions on Virginia and Southern iron was short lived. The market has fallen back into its previous apathetic condition, with very little inquiry and few transactions. The only business now being done is by the persistent drumming of consumers and does not come through the manifestation of much interest on their part for either prompt shipment or forward delivery. Northern iron at tidewater is quoted as follows: No. 1 foundry, \$15.50 to \$15.75; No. 2 X, \$15 to \$15.25; No. 2 plain, \$14.75 to \$15. For Southern No. 1 foundry we quote \$15.25 to \$15.75; No. 2, \$14.75 to \$15.25.

Finished Iron and Steel.—The effect on the buyer of the reduction in prices in steel bars, plates, structural material and sheets cannot yet be gauged. The initial cut brought about an immediate waiting policy to ascertain if it would be met generally and the week's business has been decidedly dull. It is expected that a week or two will show if the buyer agrees with the manufacturer that the bottom has been reached. The condition of affairs is disagreeable, particularly in respect to structural contracts, as every buyer wants to attach strings to the contract and get advantage of possible low prices not even dreamed of at the time of closing. The really big structural work pending has not yet been settled and the coming week ought to record the placing of a good volume of business. The American Bridge Company obtained a great deal of May's business, aggregating probably 50,000 to 60,000 tons, and of late awards reported it has the 2000-ton Riggs theater and office building, Washington, D. C.; the 1000-ton pierhead job in Brooklyn, N. Y., and a 1100-ton building at Chrome, N. J., for Armour & Co. Quotations are: Plain structural material and plates, 1.51c. to 1.56c.; steel bars, 1.41c. to 1.46c.; bar iron, 1.30c. to 1.40c., all New York. Plain material and plates from store, New York, 1.85c. to 1.95c.

Cast Iron Pipe.—Yonkers, N. Y., will open bids June 5 for 1205 tons of 30-in. water pipe. The contract for the Bronx pipe laying, on which bids were opened May 25, involving 8900 tons, was awarded to the Hanover Contracting Company, and that for Queens, 1580 tons, to Peace Brothers, the contractors buying the pipe. The leading interest was the successful bidder on 2750 tons of water pipe for the Metropolitan Water and Sewerage Board, Boston, Mass., on which bids were opened May 22, at \$21.00 delivered. The bids on this contract ranged as high as \$24. Private buyers are now doing very little, so that the market is decidedly quiet. Carload lots of 6 in. continue to be quoted at \$21 to \$22 per net ton, tidewater.

Old Material.—The volume of business is small.

transactions being few and confined to small lots. Probably the best sale of the week was 500 tons of wrought pipe. The larger dealers report that it is becoming more difficult to secure material, as holders are reluctant to part with scrap at the current low prices. Quotations are practically nominal, as follows, per gross ton, New York and vicinity:

Old girder and T rails for melting.....	\$10.50 to \$11.00
Heavy melting steel scrap.....	10.50 to 11.00
Rerolling rails.....	20.00 to 21.00
Rerolling rails.....	12.00 to 12.25
Standard hammered iron car axles.....	22.00 to 22.50
Old steel car axles.....	17.25 to 17.75
No. 1 railroad wrought.....	13.00 to 13.50
Wrought iron track scrap.....	12.00 to 12.50
No. 1 yard wrought, long.....	11.50 to 12.00
No. 1 yard wrought, short.....	10.00 to 10.50
Light iron.....	4.25 to 4.75
Cast borings.....	5.25 to 5.75
Wrought turnings.....	6.25 to 6.75
Wrought pipe.....	10.00 to 10.50
Old car wheels.....	11.00 to 11.50
No. 1 heavy cast, broken up.....	11.00 to 11.50
Stove plate.....	8.50 to 9.00
Locomotive grate bars.....	8.50 to 9.00
Malleable cast.....	10.00 to 10.50

Metal Market

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York,	Electro-lytic New York.	New York.	Lead St. Louis.	New York.	Spelter St. Louis.
May	Lake.					
25.....	12.37½	12.12½	44.20	4.37½	4.22½	5.50
26.....	12.40	12.15	44.10	4.37½	4.22½	5.50
27.....	12.45	12.25	44.00	4.37½	4.22½	5.50
29.....	12.45	12.25	44.40	4.37½	4.22½	5.50
31.....	12.45	12.25	45.50	4.37½	4.22½	5.50

Pig tin has reached a higher price in London than at any time since the corner of 1906-7. Good sales of copper have been made for export and the price on electrolytic has advanced ½c. Lead is weaker. Spelter is somewhat firmer.

Copper.—While good sales of copper have been made for export, the domestic demand is dull. Nevertheless, prices have steadily advanced during the week, and sellers as a rule are holding electrolytic at 12.25c., and lake at 12.45c. The demand for casting copper for domestic consumption has improved, and it is held at from 12.15c. to 12.20c. Domestic consumers are holding off, and the tone of their inquiries indicates that they would be willing to buy at about ½c. lower than the present market. Many of them are looking forward to the forthcoming report of the Copper Producers' Association in the expectation that the May statistics will show smaller domestic deliveries. Sellers, on the other hand, point to the excellent export business. With only to-day's delivery to account for, the exports of copper so far this month amounted to 25,725 tons, and the London market is decidedly firm. It was reported this morning that electrolytic copper is selling there at the equivalent of 12.86c., New York. The London price of standard copper for export delivery this morning is £55 7s. 6d., and for futures £56.

Pig Tin.—The London market on spot tin is clearly at the mercy of the syndicate operators who have pushed the price up to £208 10s., the highest figure asked since the memorable corner of 1906-7. The price of futures has advanced to £190, and sellers there are scrambling to cover their needs for July and August at that figure. The market here has not advanced in keeping with the London market, but this morning pig tin could not be had for immediate delivery for less than 45.50c. The situation here is better than in London, as the monthly statistics to be issued tomorrow by the New York Metal Exchange will show the deliveries for the month large, amounting to 3400 tons, but the stocks on hand are plentiful for immediate needs. It is figured that there are 2040 tons of tin available. This includes the tin now at landing. New York houses, with London connections, are informed that a determined attempt is being made there to put in effect a standard contract for tin similar to that used in the copper trade. At present London tin contracts are based on deliveries of Straits pig, and dealers there outside of the syndicate are insisting on the introduction of the standard contract to take in all the grades of tin and allow fixed reductions when impure grades are delivered under the standard contract. This will do away with the possibility of future corners in Straits pig affecting the market so seriously. At present, of the 100,000 tons of tin produced annually, 50,000 tons come from the Straits settlements. Very little local trading was done during the week, and most of the business was between dealers who were covering their future needs.

Tin Plates.—Quotations on foreign tin plates have advanced in keeping with the soaring price of pig tin and plates at Swansea, Wales, are now bringing 13s. 7½d, which is 1½d more than the price of a week ago. Inquiries for domestic tin plates have increased, but many of them, it is thought, have been prompted by curiosity, as buyers seem to think that tin plate prices will be reduced in keeping with the general lowering of steel prices. Quotations at present are firmer in New York, and \$3.94 is asked for 100-lb. coke plates.

Lead.—Lead is very weak in St. Louis, and while 4.22½c. is invariably asked there, it is declared this morning that that quotation is being shaded by some outside sellers. The demand is light, and the New York market is fairly firm at around 4.37½c.

Spelter.—Spelter appears slightly stronger, but consumers are showing but little interest. It is evident that some dealers are making liberal reductions under the usually quoted market price, which is 5.20c., St. Louis, and 5.50c., New York. Spelter can be bought in New York for prompt shipment from the West at 5.40c.

Antimony.—The antimony market is dull, and there are offers to sell Hungarian grades at around 7.75c. Hallett's is weaker at 8.95c., and Cookson's is firm at 9.50c.

Old Metals.—The market is practically lifeless. What business is done is at unchanged selling prices as follows, New York:

	Cents.
Copper, heavy cut and crucible.....	11.75 to 12.00
Copper, heavy and wire.....	11.25 to 11.50
Copper, light and bottoms.....	10.50 to 10.75
Brass, heavy.....	7.75 to 8.00
Brass, light.....	6.50 to 6.75
Heavy machine composition.....	10.25 to 10.50
Composition turnings.....	8.50 to 8.75
Clean brass turnings.....	7.75 to 8.00
Lead, heavy.....	4.20 to 4.25
Lead, tea.....	3.95 to 4.00
Zinc scrap.....	4.25 to 4.30

Chicago

MAY 31.—Copper has advanced a few points, but there is no noticeable improvement in the demand. Tin is very excitable and is quoted at 45c. Spelter and lead continue quiet with prices firm. We quote Chicago prices as follows: Casting copper, 12.45c.; lake, 12.60c., in carloads, for prompt shipment; small lots, ¼c. to ¾c. higher; pig tin, carloads, 45c.; small lots, 46.50c.; lead, desilverized, 4.35c. to 4.40c. for 50-ton lots; corroding, 4.60c. to 4.65c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.35c. to 5.40c.; Cookson's antimony, 10¼c., and other grades, 9c. to 10c., in small lots; sheet zinc is \$7.25 f.o.b. La Salle, in carloads of 600-lb. casks. On old metals we quote for less than carload lots: Copper wire, crucible shapes, 12c.; copper bottoms, 10c.; copper clips, 11¼c.; red brass, 10¼c.; yellow brass, 9c.; lead pipe, 4¾c.; zinc, 4¼c.; pewter, No. 1, 27c.; tin foil, 33c.; block tin pipe, 36c.

Iron and Industrial Stocks

NEW YORK, May 31, 1911.

The stock market has held its own remarkably well, considering the generally quiet condition of trade and the somewhat disturbing conditions of the week. The investigation of the United States Steel Corporation by a committee of the House of Representatives does not seem to have seriously affected the stocks of that corporation. A sharp advance occurred in General Electric and Westinghouse Electric. The range of prices on active iron and industrial stocks from Wednesday of last week to Monday of this week, Tuesday being a holiday, was as follows:

Allis, Chalm., com...	8 - 9¾	Railway Spr., com...	35 - 35½
Allis-Chalm., pref...	29½ - 33½	Railway Spr., pref...	102 - 102½
Beth. Steel, com...	32½ - 33½	Republic, com...	29½ - 31½
Beth. Steel, pref...	6¼ - 6½	Republic, pref...	93 - 95
Can., com...	12 - 12½	Sloss, com...	51½
Can., pref...	87½ - 88½	Pipe, com...	17½ - 18
Car & Fdry, com...	55 - 56	Pipe, pref...	57½
Colorado Fuel.....	33 - 34	U. S. Steel, com...	77¾ - 79¾
General Electric.....	159¼ - 168¾	U. S. Steel, pref...	118¾ - 119½
Gr. N. ore cert.....	61¾ - 62¼	Westinghouse Elec...	73 - 79
Int. Harv., com...	125¼ - 127	Va. I. C. & C.....	62
Int. Harv., pr.....	126	Am. Ship, com...	65 - 66
Int. Pump, com...	39¾ - 40¼	Chi. Pneu. Tool...	51¼ - 52
Int. Pump, pref...	88 - 90	Cambria Steel.....	44 - 46
Locomotive, com...	41 - 42½	Lake Sup. Corp.....	28¾
Locomotive, pref...	108¼ - 108½	Warwick.....	10 - 10¼
Nat. En. & St. com...	16 - 16¼	Crucible St., com...	13¼ - 13½
Pittsburgh Steel, pref...	—	Crucible St., pref...	81¾ - 82¾
Pressed St., com...	35 - 35½	Harb. Walk Ref., com...	45
Pressed St., pref...	101	Harb. Wk. Rf., pref...	96½ - 101

The Jones & Laughlin Steel Company has placed with Blair & Co., New York, and the First Trust and Savings Bank of Chicago an issue of \$10,000,000 of its 5 per cent. bonds. The same banking interests were the purchasers of the \$15,000,000 of 5 per cent. bonds

issued by the company about two years ago. It is stated that the new issue will provide funds for a continuance of the company's expansion in productive capacity.

Dividends.

The Railway Steel Spring Company has declared the regular quarterly dividend of 1¼ per cent. on the preferred stock, payable June 20.

The Westinghouse Electric & Mfg. Company has declared the regular quarterly dividend of 1¼ per cent. on the preferred stock, payable July 15.

The American Can Company has declared the regular quarterly dividend of 1¼ per cent. on the preferred stock, payable July 1.

The American Society of Mechanical Engineers

PITTSBURGH, PA., May 31, 1911.—(By Telegraph).—The opening night of the convention of the American Society of Mechanical Engineers, Tuesday, indicated that the meetings now being held here will be among the most successful in the history of the society. The registration Tuesday evening had reached 370, which means that the final attendance will considerably exceed 500 and will be probably the largest which has ever been had at a spring meeting.

To a great extent this is due to an unusually attractive programme of papers. Further it is an attestation to the wisdom of grouping the papers by subject. In this instance there will be a cement works session, a machine shop session, a gas power session, and a miscellaneous session. Equally responsible for the large attendance is the selection of a city centrally located and abounding in industries of interest as objectives for excursions, the steel works leading, closely followed by the large cement works.

A feature of the informal reception opening the convention Tuesday evening was the presentation of an engrossed testimonial to the President, Col. E. D. Meier, in commemoration of his 70th birthday anniversary, and in appreciation of his distinguished career in military service and in engineering. On behalf of the committee in whose hands the testimonial was placed, C. J. H. Woodbury, the secretary, made the presentation concluding with the request that Colonel Meier give sittings to an artist for his portrait.

H. R. C.

Republic Iron & Steel Company Operations.—The new No. 4 blast furnace of the Republic Iron & Steel Company at Haselton, Ohio, is about finished and will go in blast early next week. The blowing engines have been turned over and the furnace is about ready to start. This gives the company five blast furnaces in the Youngstown district. It is the intention to blow out No. 2 furnace at Haselton for relining and repairs as soon as No. 4 stack is started. Orders were issued in Pittsburgh on Monday to start up four of the eight new 60-ton open-hearth furnaces at the company at Haselton, and they will probably start about June 10. The other four open-hearth furnaces will not be started until conditions in the steel trade improve.

The Longdale Iron Company, Longdale, Va., which blew out its second furnace in May, now has both its furnaces out of blast and does not intend to resume operations again. The No. 1 furnace—called the Lucy Selina—was built in 1827 as a charcoal furnace and was the oldest iron furnace in Virginia. It was rebuilt as a coke stack in 1867 and later was further remodeled and enlarged. Furnace No. 2 was first blown in in February, 1881, and enlarged in 1890. The product was chiefly basic pig iron cast in chills, and the rated annual capacity is put at 40,000 tons. Longdale was the first marchant furnace in the United States to make basic pig iron.

W. N. Kratzer & Co., structural steel fabricators, Pittsburgh, have received a contract for the structural steel to be used in a high school building at Titusville, Pa.; bear traps for Ohio River dam No. 26; power house and small bridge for the Union Carbide Company, Niagara Falls, N. Y.; steel tank tower for the Meadow River Lumber Company, Rainelle, W. Va., and an extension to the Union Depot, Baltimore, Md.

The Steel Corporation Investigation

Some of the Testimony of John W. Gates

WASHINGTON, D. C., May 29, 1911.—For more than four hours on Saturday John W. Gates testified before the special investigating committee of the House of Representatives that has been appointed to investigate the operations of the United States Steel Corporation, and especially the merger of the Tennessee Coal, Iron & Railroad Company with the Steel Corporation.

Throughout the hearing Mr. Gates dealt elaborately with the details of the organization of the corporation in 1900 and 1901, with the initial proceedings of which he claimed to have had an important part. Mr. Gates also gave what he claimed to know and also more or less hearsay and opinion regarding the acquisition by the Steel Corporation of the stock in the Tennessee Coal, Iron & Railroad Company, and the causes which lead up to that acquisition.

Throughout the hearing Mr. Gates was interrogated on practically every point with reference to the organization of the Steel Corporation and the acquisition of the different properties and corporations which were merged with that corporation, down to and including the securing of the control of the stock in the Tennessee company. The interrogations were propounded by Representative Stanley, of Kentucky, the author of the resolution providing for the investigation. Questions were also propounded by Representatives Bartlett, of Georgia; McGillicuddy, of Maine; Beall, of Texas, and Young, of Michigan.

The principal features of Mr. Gates' testimony related to the differences of opinion which he entertained from those of his co-stockholders in the Tennessee company regarding the feasibility of the sale and the price agreed upon by way of exchange of Steel Corporation bonds for the stock of the Tennessee company. Although he did not specifically say so, it was evident from his testimony that Mr. Gates did not agree with the popular conception that has obtained as a result of expressions made in federal official circles at the time and since the acquiring of the Tennessee company by the Steel Corporation, that this merger was necessitated on account of panic conditions prevailing in the autumn of 1907, and he emphasized this by repeated references to the fact that little, if any, money passed in the transaction. He called attention, however, to the large amount of Tennessee company stock which was held as collateral by a leading bank and trust company in New York, to which organization the complaint had been made by the clearing house of New York that the institution carried too large a percentage of Tennessee company's stock as collateral security for its outstanding loan.

Another feature of Mr. Gates' testimony was his description of the intimate details connected with the organization of the Steel Corporation and his rather sharp and sarcastic comments upon the shrewdness of Mr. Carnegie in so manipulating the affairs of his steel industry as to bring about a sale to the newly-organized Steel Corporation at vastly greater compensation than Mr. Carnegie had suggested a willingness to sell for a short time previous to the final culmination of the transaction which resulted in a transfer of the Carnegie interests to the corporation.

A large part of the hearing was devoted to inquiries by Chairman Stanley, directed to Mr. Gates upon hypothetical cases which sought to elicit from Mr. Gates an expression of opinion as to whether the gigantic consolidations of iron, steel and allied corporations had been beneficial to the trade and to the consuming public. For the most part Mr. Gates declined to make specific and direct answers to these questions, which he declared to be hypothetical and which could not be answered without precise knowledge as to what conditions would be at a given time if the great combinations in the iron and steel industry had not been effected. Mr. Gates was very specific in his declaration that, according to his view of the matter, the deal by which the Steel Corporation acquired the Tennessee company's stock was a big bargain for the corporation, and that those who parted with their stock had not realized a fair profit upon the investments they had made, considering

the time and labor that had been expended in developing the Tennessee company.

The testimony of Mr. Gates before the committee was in part as follows:

Tennessee Coal, Iron & Railroad Syndicate

The Chairman: Were you ever interested in any way in what was once known as the Tennessee Coal, Iron & Railroad Company?

Mr. Gates: I was a stockholder and director and member of the executive committee. A syndicate was formed during my absence in Texas, in November or December, 1904 or 1905, which acquired a controlling interest in the Tennessee Coal, Iron & Railroad Company. The syndicate was managed by Grant B. Schley, of Moore & Schley, and Charles S. Guthrie, then president of the Republic Iron & Steel Company. They acquired through purchase in the open market, some possibly by private sale and purchase, a large majority of the shares of stock of the Tennessee Coal, Iron & Railroad Company. They telegraphed me what they had done and I acquiesced in their action and took a proportionate amount of the total stock purchased, which my recollection is was in the neighborhood of 200,000 shares. There were some ten or twelve and perhaps fifteen men interested in what was known as the Tennessee Iron & Coal Syndicate. Under the terms of the syndicate agreement the managers of the syndicate, Mr. Schley and Mr. Guthrie, had a right to sell the stock without asking any questions, provided they sold it at a profit, but they could not sell the stock at a loss without the consent of all the syndicate members. Mr. Guthrie passed away a few months later, and L. C. Hanna, of Cleveland, Ohio, was elected as the associate syndicate manager with Mr. Schley. Mr. Hanna is a brother of the late Senator Hanna. We proceeded to operate and improve the company as fast as we could, consistent with good business judgment, and I sailed for Europe in July, 1906.

The Chairman: You speak of improving this property.

Mr. Gates: Perhaps it was 1907. We went to Europe in July and we returned from Europe on November 6 or 7. When we returned to America this country was in the throes of a panic, and I picked up a newspaper in the morning before we got off the ship and saw that the stock of the Tennessee Coal, Iron & Railroad Company had been sold to the United States Steel Corporation.

Mr. Bartlett: Did you give the date of your return?

Mr. Gates: November 6, 1907, I think it was; I will not be positive as to dates, but I know it was a legal holiday and that there was an election the day I returned.

Mr. Bartlett: You may fix it by this. The letter of the President to the Attorney General is dated Nov. 4, 1907.

Negotiations for Change of Control

Mr. Gates: On my arrival at the Plaza Hotel I found a note from Mr. Schley, who had an office then and has one now at 747 Fifth avenue, between Fifty-seventh and Fifty-eighth streets, asking me if I would not please come over to his office at once. I probably got there either about eleven or twelve o'clock, and I found negotiations pending between Mr. Frick, Judge Gary and Mr. Morgan on one side, and Mr. Schley, Mr. Hanna and associates on the other side, and I was told that they were all at Mr. Morgan's residence. Judge Gary, Mr. Morgan and Mr. Frick were trying to acquire this block of stock, which was the control by a very large majority.

Various telephonic conferences occurred between Mr. Morgan's residence and Moore & Schley's office on Fifth avenue. Judge Gary, Mr. Morgan and Mr. Frick were trying to acquire this stock, as I remember it, by an exchange of an equal amount of what was known as United States Steel second 5's. In other words, for each ten shares of the Tennessee Coal, Iron & Railroad stock they were to get one of the second mortgage bonds of the United States Steel Corporation. I said to Mr. Morgan I thought that was not enough, and I was not willing to trade on that basis. So after three, four or five hours of telephoning backward and forward we made a trade with them on the basis, as I remember it, of about 119¾ per cent. of United States Steel sinking bonds 5, as they are known, for Tennessee stock.

Under the terms of the trade we were to tender our resignations as directors in a body, and the United States Steel Corporation were to elect such men as they selected to succeed us. We were to meet, I think, the following morning at the office of the Tennessee Coal, Iron & Railroad Company, at the Realty Building, 115 Broadway, at

eleven o'clock. We met at the appointed hour, and I said to Judge Gary, "You are simply buying a majority of this stock and taking the resignations of the board of directors."

Mr. Bartlett: Judge Gary was chairman of the board of directors of the United States Steel Corporation?

Mr. Gates: He was the chairman of the board of directors of the United States Steel Corporation, and Mr. Corey was its president, and he was also there. He said to us: "We do not care anything about the minority." "Well," I said, "we do care about having the minority treated exactly the same as the majority, and we will not turn over this stock unless you pass a resolution and give us a copy of it agreeing to pay all of the minority stockholders the same price for their securities as you pay the majority stockholders." After some discussion a resolution was passed and a copy handed to us, agreeing to take care of the minority stockholders on the same basis and at the same price and terms that the majority stockholders were taken care of. That is about all I can tell you about the Tennessee Coal, Iron & Railroad proposition.

Mr. McGillicuddy: Who owned the majority stock?

Mr. Gates: I stated earlier that the majority of the stock was bought by a syndicate. Col. Oliver Payne was in that syndicate and, I think, J. B. Duke and E. J. Berwind.

Mr. Bartlett: O. H. Payne, L. C. Hanna, G. B. Schley, J. B. Duke, E. J. Berwind, J. W. Gates, A. N. Brady, G. A. Kessler, O. Thorne, E. W. Oglebay, H. S. Black, F. D. Stout, J. W. Simpson, G. W. French, S. G. Cooper and J. A. Topping. Is that correct?

Mr. Gates: I think that is a correct statement of the syndicate.

The Chairman: Do you recall the shares that they held of this stock?

Mr. Gates: There were varying amounts.

The Chairman: I do not mean the separate amounts, but the combined amount.

Mr. Gates: I think there was in the neighborhood of 200,000 shares, perhaps more. In the original participation I think Payne, Kessler, Berwind, Schley, Duke and myself each had 18,000 shares. The others were divided up in smaller denominations; some had 3,000, some had 5,000 and some had 9,000.

The Chairman: You spoke of exchanging the bonds or the stock of the Tennessee Coal, Iron & Railroad Company for the second mortgage bonds of the United States Steel Corporation?

Mr. Gates: Yes, sir.

The Chairman: Which security had the greater basis of tangible value behind it, the stock or bonds of the Tennessee Coal, Iron & Railroad Company or the second mortgage bonds of the Steel Corporation, for which they were exchanged?

Mr. Jones: That, if you please, is a question of opinion, and my understanding is that you are after the facts here, but I have no objection to Mr. Gates stating his opinion, if he so desires.

The Chairman: I will not insist upon Mr. Gates giving an answer to that question, but I think his opinion would have great weight before this committee.

Value of Tennessee Coal & Iron Stock

Mr. Gates: I can only give you an answer by telling you what the quotations on the New York Stock Exchange were for each of the securities at the time of the exchange. I think the Tennessee Coal, Iron & Railroad stock was selling at somewhere between \$120 and \$160 per share at that time, and the United States Steel sinking fund seconds were selling between \$80 and \$85.

Mr. Bartlett: The prices of securities of that sort are generally controlled by what is behind them; I do not mean the speculative price, but the price on the market, rather the difference in the value of the property that is behind it?

Mr. Gates: That is supposed to be the fact, but I do not know that it always is.

The Chairman: What I had in mind was this, this was in time of stress, panic, and collateral very often is measured by what you can get on it under an execution, as we say, a forced sale of tangible property, that can be reached by virtue of foreclosing the bonds or putting up the property behind the stock. Now, which one of those two securities had the greater amount of tangible, unencumbered property behind it, the stock or bonds of the Tennessee Coal, Iron & Railroad Company or the second mortgage bonds of the United States Steel Corporation?

Mr. Young: Those exchanged or the whole of the stock?

The Chairman: Those for which the exchange was made.

Mr. Gates: The second mortgage bonds of the United States Steel Corporation are practically a promise to pay. I do not think there is any particular security behind them except the preferred shares of the Steel Corporation itself. The stock of the Tennessee Coal, Iron & Railroad Company

represented the total equity in the property of the Tennessee Coal, Iron & Railroad Company over and above its bonded indebtedness.

The Chairman: What property had you there, what kind of property, the stock; what amount of ore was available at that time?

Mr. Gates: Well, I do not think anyone could testify correctly to-day as to the amount of ore owned by the Tennessee Coal, Iron & Railroad Company. It would take a year to correctly measure up the amount of ore we had. We always estimated that we had not less than 300,000,000 tons, and we might have 500,000,000 to 700,000,000 tons of iron ore in the Tennessee Coal, Iron & Railroad Company property. The coal acreage was enormous. Unless I saw a statement of the Tennessee Coal, Iron & Railroad Company I could not give anything like any approximate statement of the coal. If you will let me see that statement I am willing to testify whether I think that statement is fairly correct.

The Chairman: I believe you estimated your acreage, the tonnage of coal, to be something like 1,400,000,000 tons of coal?

Mr. Gates: Well, Mr. Chairman, I could so easily make a mistake of 500,000 tons that I should prefer to look at the statement. I had a voice in drawing up that statement, and I know I thought it was correct at the time I assisted in drawing it up.

The Chairman: How are the coal, iron ore and limestone located with reference to the convenience for assembling your ores. Were they separated by any great distances or were they close together?

Mr. Gates: I think that in the Birmingham district it is possible to assemble a ton of material and make a ton of pig iron cheaper than at any other place in the world.

The Chairman: I think Mr. Schwab made the same statement before the Ways and Means Committee. I want to call your attention to this statement. It has been estimated that you could make a ton of steel rails or convert the iron ore at \$2 or \$3 less cost per ton. I think Mr. Schwab makes it \$4 a ton.

Mr. Gates: A ton of pig iron, under the most modern practice in what is known as the Birmingham district, can be produced to-day for less than \$9 a ton. There is no other part of the United States that I am acquainted with where it can be produced at less than \$11 a ton, based on the freight rates for assembling the raw material.

The Chairman: This company seems to show some improvement in its property by the character of betterments made in the years 1906 and 1907, before its absorption by the United States Steel Corporation. Do you remember what improvements were made on that property at that time?

Mr. Gates: We spent money as fast as we could and do it intelligently. I think we spent during the time we had the property somewhere between \$6,000,000 and \$8,000,000.

The Chairman: For what was that money spent?

Mr. Gates: Everything you can think of to improve a steel plant or a blast furnace or a coke oven or a coal mine or a dolomite quarry.

The Chairman: Now, what were you doing, getting any business in the way of orders for converting this ore into rails and the like of that?

Mr. Gates: We had just taken a very large order for rails, I think, 150,000 tons of rails from E. H. Harriman, at \$2 per ton advance over the price of Bessemer steel rails.

Mr. Beall: What kind of a rail were you making?

Mr. Gates: We were making a Bessemer open-hearth rail. We took the contract, I think, for the Southern Pacific and the Union Pacific roads for an open-hearth rail. Whether they were actually making the rails at the time the company was taken over by the corporation I do not remember, but we were preparing to make the open-hearth rail and had sold 150,000 tons.

The Chairman: What was the reason for this excess in the price of your rail over the Bessemer rail?

Mr. Gates: We thought it was a better rail and we convinced Mr. Harriman.

The Chairman: Did you get orders from any other concern?

Mr. Gates: The Harriman order was a large order and it would take several months to fill it. We had some small orders, but that practically put us out of the market.

Mr. Beall: Was the United States Steel Corporation in a position to make that character of rail at that time?

Mr. Gates: They had open-hearth plants in the north, but I do not think they had made for the commercial market any open-hearth rails; they might have made a few trials.

Mr. Young: Had you made any before that time?

Mr. Gates: Yes, sir.

Mr. Young: To any great extent?

Mr. Gates: Yes; we had made a good many thousand tons, but we were putting in a new and improved mill to

make the rails cheaper; they were costing more than they should have cost.

The Chairman: Was there any other concern in the United States, Mr. Gates, or in America, that was situated with reference to its raw material, the natural resources, as favorably as the Tennessee Coal, Iron & Railroad Company, with the possible exception of the United States Steel Corporation, at the time it acquired this company?

Mr. Gates: The Republic Iron & Steel Company was as favorably situated with its Birmingham plant, but it was making only pig iron, but the Republic Iron & Steel Company can make just as cheap steel by the expenditure of money as the Tennessee Coal, Iron & Railroad Company was making. Their situation is practically identical with the Tennessee Coal, Iron & Railroad Company.

No Money Transfer in Change of Control

The Chairman: It has been stated on rather high authority that at the time the Tennessee Coal, Iron & Railroad Company was acquired there was a certain business firm, the name of which is not given, which would undoubtedly have failed in New York if help had not been given it, and it is alleged that a branch of this business firm had among its assets a majority of the securities of the Tennessee Coal, Iron & Railroad Company, and that an application had been made to the United States Steel Corporation to purchase this stock, in order to save a financial institution in the State of New York and avert a panic. Do you know anything about such a situation in New York on election day when you landed?

Mr. Gates: My answer is that in the exchange of these securities there was not a dollar changed hands.

The Chairman: And no bank received any additional assistance by virtue of the absorption of this concern?

Mr. Gates: I think not.

The Chairman: Did any member of the Tennessee Coal, Iron & Railroad Company make any application to the United States Steel Corporation to accept a comparatively worthless property in order to save the country?

Mr. Gates: I do not think I could answer that. I think that question is a little bit facetious, if you will excuse me.

The Chairman: I want to know who flew that alleged signal of distress from the Tennessee Coal, Iron & Railroad Company, notwithstanding this condition of affairs which you have described.

Mr. Gates: There are a great many underground wires in New York. We have a clearing house association. I was told that a certain bank or trust company applied to the clearing house association for assistance, that a committee was appointed by the clearing house association to examine their assets, and that in the examination of their assets they discovered that several million dollars of their loans in collateral were on the stock of the Tennessee Coal, Iron & Railroad Company, and that they reported back to the committee that there were too many dollars loaned on Tennessee Coal, Iron & Railroad stock. I am giving you now what bankers have told me, and what persons in this deal have told me, not what I know of my own personal knowledge. That as a result of this investigation a gentleman was invited to Mr. Morgan's house, and Mr. Morgan suggested to relieve the congestion that the Steel Corporation might acquire the Tennessee Coal, Iron & Railroad Company. This is hearsay evidence.

The Chairman: It has been stated by a certain distinguished official of this government—I will not give my authority—that on Nov. 4, 1907, Judge Gary and Mr. Frick informed him that as a mere business transaction they did not care to purchase the stock, and under ordinary circumstances they would not consider purchasing the stock because but little benefit would come to the Steel Corporation from the purchase, that they were aware that the purchase would be used as a handle for attack upon them on the ground that they were striving to secure a monopoly of the business and prevent competition—not that this would represent what could be honestly said, but what might be recklessly, and untruthfully said. Do you know or have you heard by rumor or otherwise of any appeal to the tender sensibilities of the purchasers of this concern to take it on account of the conditions mentioned in this communication?

Early Offers for Tennessee Coal & Iron Stock

Mr. Gates: I think Mr. Morgan offered Mr. Kessler, who was one of the men in this syndicate, \$150 a share for his stock, conditioned upon the corporation ratifying the trade.

The Chairman: What did you actually get for your stock?

Mr. Gates: Well, that is a hypothetical question. We got 119¾ per cent. of second mortgage steel bonds that are now worth 108, worth then 80 and 85.

The Chairman: What were the second mortgage bonds worth at the time you were offered \$160 for your stock?

Mr. Gates: I was never offered \$160 for my stock.

The Chairman: At the time the offer was made?

Mr. Gates: Mr. Kessler told me that Mr. Morgan said he would give \$150, if his colleagues would agree to it, in the Steel Corporation. They did not agree to it at that time.

Mr. Beall: Just for Mr. Kessler's stock or the stock of the syndicate?

Mr. Gates: The entire syndicate's stock. Mr. Kessler had a large block of stock, and when this syndicate went to acquire if they discovered that Kessler was a factor in the Tennessee Coal, Iron & Railroad situation, and so they took him in. I do not know this to be true. Kessler made that statement.

The Chairman: In your opinion, Mr. Gates, what per cent. of the actual value of the Tennessee Coal, Iron & Railroad Company did the Tennessee Coal, Iron & Railroad Company receive at the time of this sale under the conditions you have mentioned?

Mr. Gates: That is purely a matter of opinion and I would hardly care to reply to it directly. If they sold their bonds, the bonds went as low as 78, they got less than par. If they held them until they got 106 or 108, they got 120 or 125 for their stock. I think my stock cost in the neighborhood of 105. I took the original amount of 18,000 shares at about 108 or 112, and then we put in effect several million dollars of the stock on which we declared a 4 per cent. dividend.

The Chairman: I was referring to a reported interview which appeared in the hearings before the Senate Committee, in which you are reported as saying: "As to the purchase of the Tennessee Coal, Iron & Railroad Company by the United States Steel Corporation, the steel men got the best property in the country, and at a bargain price. I regard it as a sacrifice of stock worth a great deal more than the purchase price. I did not want to sell my stock, but had to follow the crowd. Had Tennessee stock been thrown on the market I would have been better off, as I could have increased my holdings at a low price. The iron ore and coal deposits of the Tennessee company are worth many times more than the entire cost of the property to the Steel Corporation."

Mr. Gates: That I would be willing to make an affidavit to to-day, in my opinion; it is purely an opinion.

The Chairman: It has been stated on very high authority, Mr. Gates, and this statement was made by an official of this Government to another official, they are referring now to Mr. Gary and to Mr. Frick: They further inform me that as a matter of fact the policy of the company has been to decline to acquire more than 60 per cent. of the steel properties, and that this purpose has been persevered in for several years past, with the object of preventing these accusations, and as a matter of fact their proportion of steel properties has slightly decreased, so that it is below this 60 per cent.; the acquisition of the property in question will not raise it above 60 per cent.

Mr. Jones: At what time was that statement made?

The Chairman: Nov. 4, three or four days before the election. Prior to the time your properties were actually sold, were any efforts made other than those you have mentioned by the United States Steel Corporation to acquire this property?

Mr. Gates: Not that I know of.

The Chairman: Do you know whether it had been the desire or purpose of the corporation to get hold of this property, if an opportune occasion ever offered, for several years prior to that time?

Mr. Gates: That is hardly a fair question. I cannot tell what was in the minds of the corporation.

The Chairman: I am asking for an opinion as to what efforts had been made to purchase this property of which you are aware, or propositions like the proposition you spoke of, 150 for the stock, if a proposition had been made. A farmer knows whether some one wants to buy his horse by the way people talk to him, and I presume it would be the same way with a property of this kind, that if you wanted to get hold of it there would be somebody actively at work.

Mr. Gates: They had a large brokerage house in which some of the prominent members of the corporation do a great deal of business approach my son probably a year before, and he said he could handle the property at a satisfactory price if we gave him an option. In that talk he intimated it was for the corporation, but I do not know whether it was or was not.

The Effort to Avoid a Panic

The Chairman: This statement is further made as to these gentlemen, Mr. Frick and Judge Gary, made by one official of the Government to another: "But they feel that it is immensely to their interest, as to the interest of every responsible business man, to try to prevent a panic and general industrial smashup at this time, and they are willing to go into this transaction, which they would not other-

wise go into, because it seems the opinion of those best fitted to express judgment in New York that it will be an important factor in preventing a break that might be ruinous, and that this has been urged upon them by the combination of the most responsible bankers in New York who are now thus engaged in endeavoring to save the situation." Did this combination of bankers of which Mr. Morgan is the reputed head lose greatly by that panic?

Mr. Jones: That is again asking for Mr. Gates' opinion.

The Chairman: Mr. Gates has an opinion about that, for they allege here that these bankers took over this property to save the situation at a great sacrifice, that they saved properties worth several millions of dollars. I thought he would know something of the loss they made by virtue of this patriotic effort to save the situation, but I want to know the whole truth both in favor of the Steel Corporation and against it, and both in favor of the bankers and against them?

Mr. Gates: I never heard any rumor about the danger of Mr. Morgan making an assignment. I do not know whether he made money or lost it.

The Chairman: Did the sale of this concern have any effect, could it have had any effect, upon the stress at that time other than the stress upon one or two individuals in the Tennessee Coal, Iron & Railroad Company?

Mr. Gates: There was not a dollar changed hands; it was simply a shifting of securities, a shifting of collaterals.

Mr. Bartlett: It did not add a dollar to the circulation in New York?

Mr. Gates: It did not add or detract a dollar from the situation.

The Chairman: I believe Mr. Schley, who makes a statement in the Senate report, is sick now and not able to be here?

Mr. Gates: Yes, sir.

The Chairman: As I gather from the published report of Mr. Schley, this was a forced sale, that he was squeezed on the street. To what extent was this sale forced, and, if you know anything about who did the forcing, I wish you would let me know.

Mr. Gates: I regarded it as a forced sale. I had no accounts myself with Moore & Schley's office. He was not borrowing any money for me on any securities that he was holding as agent for me; I had no account with him. I had taken up my securities at the time the transaction took place. My surmise would be that the finding of a large amount of Tennessee Coal & Iron as collateral in one of the banks or trust companies had to do with the forced sale.

The Chairman: Did Mr. Morgan have any decided influence over the attitude of this bank and trust company toward the Tennessee Coal, Iron & Railroad Company stock?

Mr. Gates: I do not know. It is pretty hard to tell where a man's influence starts or ends on Wall Street.

Tennessee Coal & Iron Sold at Bargain

Mr. McGillicuddy: At the time this deal was consummated, in November, 1907, whereby the stock of the Tennessee Coal & Iron Works was transferred in exchange for the steel seconds, what, in your opinion, was the total value of the property of the Tennessee Coal, Iron & Railroad Company Works?

Mr. Gates: My opinion is that it was bought at a bargain sale; it was a forced sale on the part of the owners of the Tennessee.

Mr. McGillicuddy: Would you give us your opinion as to its total value, approximately?

Mr. Gates: At the time Kessler reported to me an offer of \$150 from Morgan, I will say I did not think that was enough for the property.

Mr. McGillicuddy: Can you not give us your opinion as to what its fair market value would be?

Mr. Gates: No, because I might be very widely wrong. To give you an idea, the Tennessee Coal, Iron & Railroad Company owns what is known as Red Mountain, which has an immense body of ore with tunnels and shafts going into it, but not through it. If that ore should pinch out, if the drills would show that the ore did not go greater than a certain depth, I might be mistaken. You are asking me to give you an approximate idea when it is almost impossible to form that without complete drill statistics.

Mr. McGillicuddy: So far as the property was disclosed at that time it must have had in your mind some value?

Mr. Gates: The answer is, I was willing to pay \$108, \$109 or \$110 a share for it, long before this, and was not willing to take \$150.

Mr. McGillicuddy: What would you have been willing to take at that time?

Mr. Gates: I did not want to set a price on mine.

Mr. Young: Mr. Gates, how many shares of stock were there in the Tennessee Coal, Iron & Railroad Company?

Mr. Gates: I should say 200,000 or 300,000.

Mr. Young: The par value of the stock was \$100 a share?

Mr. Gates: Yes, sir.

Mr. Young: What properties did it own?

Mr. Gates: Iron ore, magnetite, coal, coke, coke ovens, blast furnaces, limestone quarries, rolling mills and so forth.

Mr. Young: Did it own any railroads?

Mr. Gates: Yes; they were interested in a railroad, the Birmingham Southern, I think. It ran from Birmingham to the mines, and the steel plants, and perhaps to some of the coke operations. Mr. Jones tells me a total of nearly one hundred miles.

Mr. Young: The road was built for the purpose of handling the raw material, the product of the Tennessee Coal, Iron & Railroad Company?

Mr. Gates: Yes, sir. We did commercial work for everybody; we published a tariff, I think, but the main business was the business of the T. C. I.

Mr. Young: I understood you to say that this was a forced sale?

Mr. Gates: I regarded it as a forced sale. I did not have to sell my stock. Under the agreement, as I recollect it, Schley and Hanna had a right to dispose of the stock if at a profit, but they had no right to dispose of the stock at a loss.

Mr. Young: Was it sold at a loss?

Mr. Gates: Considering the money and the time we spent in it, I think we lost money. I did a great deal of work in it, without money and without price, and all the rest of them did.

Mr. Young: Did you get as much for it as you paid for it?

Mr. Gates: There you come back to the question of what sinking fund bonds were worth.

Mr. Young: Assuming they were worth what they sold for in the market at the time?

Mr. Gates: We lost money.

Mr. Young: About how much per share?

Mr. Gates: I would say \$10 or \$15 a share at that time. I think the bonds sold down to 78.

Mr. Young: When the panic had eased up, I suppose these bonds, like other securities, went up?

Mr. Gates: Yes, sir.

Mr. Young: And it was true also, was it not, that during the panic the stock of the Tennessee Coal, Iron & Railroad Company greatly depreciated because of the situation?

Mr. Gates: Well, I think the stock of the Tennessee Coal, Iron & Railroad Company, if it had not been unduly depressed, would not have gone down much, because it was held by a syndicate of men who we all thought could go through any panic and carry their securities.

Mr. Young: Unless you were mistaken about that, why did they not carry it through instead of selling it at a loss?

Mr. Gates: They discovered a lot of it up as collateral in the Trust Company of America. Mr. Thorne was one of the syndicate. The bank is solvent, strong, and the stock selling at \$300 or \$400 a share.

Mr. Young: But you say this bank had made application to the clearing house for help?

Mr. Gates: There was a run on them then by the brokers.

Mr. Young: They needed ready money?

Mr. Gates: They needed \$10,000,000 of ready money, and they asked the clearing house banks for the money, so the president of the trust company told me. I was a shareholder.

Mr. Young: Do you know whether they got the money?

Mr. Gates: Yes, sir, they got it.

Mr. Young: And do you know from whom they got it?

Mr. Gates: I think the syndicate was made up in Morgan's office. At least, I was in the bank, and I heard Mr. Thorne, the president, talking over the 'phone. I do not know it from personal knowledge, but when he shut off the 'phone he turned to me—he is a friend of mine—and said, "That was George Perkins I was talking to."

Mr. Young: And then do I understand the situation to be this, that Mr. Morgan was willing to come to the relief of this bank provided he could get this stock?

Mr. Gates: Not of my personal knowledge.

Mr. Young: You had no knowledge on the subject?

Mr. Gates: No, nothing definite.

Mr. Young: As to this offer made to Mr. Kessler, if I understood you correctly, the statement was made that Mr. Morgan had said to Mr. Kessler that if his associates would agree to it he would take the control of the stock of the Tennessee Coal, Iron & Railroad Company at \$150 a share?

Mr. Gates: I had best state the way this came about. Mr. Kessler, knowing that I had originally 18,000 shares in the syndicate, and that I had put up my percentage of assessments for doing new work, which brought my total of securities up to 22,000 to 24,000 shares, asked if I would

agree to a trade on that basis with Morgan, and I told him no. My understanding was that Mr. Morgan said it would have to be ratified by Gary and Frick; that is, they would have to agree to it, or there would be no trade. I do not know whether Kessler went to every member of the syndicate or not. As far as I know there was nothing came of it.

Mr. Young: What was the Tennessee Coal, Iron & Railroad stock quoted at in the market at the time this offer or proposition was being considered?

Mr. Gates: I think it was quoted about \$150 to \$160. I think it a fair statement to say that the day before Gary and Frick went to see Roosevelt, if a man had gone in the market and tried to buy 2500 shares of stock of the Tennessee Coal, Iron & Railroad Company he would have probably had to pay \$150 a share average. On the other hand, if he had tried to sell 2500 shares of the Tennessee Coal, Iron & Railroad he might have been obliged to sell it at \$110 or \$115 average. There was probably no floating stock, it was so closely held by the people who had bought it for investment. There was practically no stock in the hands of brokers.

Mr. Young: On the other hand, there was no money with which to make new investments available in New York during the panic, was there, at that time?

Mr. Gates: It was pretty hard to get.

Mr. Young: You stated that, in your opinion, pig iron could be made at Birmingham at \$9; does that relate to this time, or the time when this transaction took place, when the property was sold?

Mr. Gates: The Republic is making it for that to-day.

The Ore Question

Mr. Young: What did the ore you were using run in metallic iron?

Mr. Gates: It varied between 35 and 44 per cent. If using Red Mountain ore, which was the large body owned by the T. C. I., I would say the average would be 38 or 39. If using a brown ore, it might run up to 44 or 48.

Mr. Young: Was the cost in assembling this higher grade brown ore greater per ton than of assembling the Red Mountain ore?

Mr. Gates: Yes, sir, because it lay in more scattered districts. As to mining cost, if you strike a pocket with 10,000 tons of brown ore you can take it out very cheaply. If you only had 100 tons it would cost you a lot of money. But the Red Mountain ore is a steady mining proposition. You can figure about what your cost will be.

Mr. Young: In practice, how much iron ore did it take in the furnace to make a ton of pig iron? About two and a half on the average?

Mr. Gates: Approximately that, I think.

Mr. Young: What is the character of the coal that you have there?

Mr. Gates: We have got all kinds of coal, the same as all kinds of ore. The best coal down there is what is known as the Pratt seam. It is a high grade coke coal, the best in the South. It is not so good as the Northern coking coal, the Pennsylvania coal. If you wash the sulphur out of it it is just as good as Connellsville.

Mr. Young: How does this ore run in phosphorus there at Birmingham?

Mr. Gates: It is all a non-Bessemer ore. There is no Bessemer ore in the South that I know of.

Mr. Young: The iron ores in the Lake Superior region run considerably higher in iron, do they not; those that are used commercially?

Mr. Gates: They usually do. I think this year the scale is $51\frac{1}{2}$ metallic iron, or 51.

Mr. Young: Many of them run to 56, do they not?

Mr. Gates: Yes, and many of them to 46.

Mr. Young: Not a very large proportion that is being now used?

Mr. Gates: They treat it. We are mining ore in Canada that lies, in its natural state, 40, and we sweeten it up and ship it 54 or 55; but we have to sort it.

Constitution of Tennessee Coal, Iron & Railroad Company

Mr. Young: Is the Tennessee Coal, Iron & Railroad Company a holding company?

Mr. Gates: It owns its own properties. I think it has few subsidiary corporations.

Mr. Jones: The Birmingham Southern Railroad is one.

Mr. Young: Are there any subsidiary companies that own coal or iron ore lands?

Mr. Gates: There may be some in which we own an undivided interest, or a three-fourths interest, or a one-fourth interest. I cannot tell you without going through this. Take the Potter Ore Company, of which the Republic and ourselves jointly guaranteed a bond issue. That is a separate company, but it is operated for the benefit of the Tennessee Coal, Iron & Railroad Company and the Republic Iron & Steel Company, and both are joint guarantors on the bonds.

Mr. Young: Do you know what proportion of the stock of the Tennessee Coal, Iron & Railroad Company is now owned by the United States Steel Corporation?

Mr. Gates: Practically all of it, I think.

Mr. Young: Only a few outstanding shares?

Mr. Gates: There might be a few shares of preferred outstanding; I think probably there are. There are usually a few people who try to get a fancy price for their last few shares.

Mr. Young: You are now operating the Republic Iron & Steel Company in the Birmingham region?

Mr. Gates: We have three furnaces down there and a thousand coke ovens.

Mr. Young: Are the conditions for the manufacture of pig iron by the Republic Iron & Steel Company of Birmingham as good as the facilities for the manufacture of pig iron by the Tennessee Coal, Iron & Railroad Company?

Mr. Gates: I think they are practically alike.

Mr. Young: And have you large properties belonging to the Republic Iron & Steel Company at Birmingham?

Mr. Gates: We have an investment down there of \$10,000,000 or \$12,000,000. You might look at it as small.

Mr. Young: Have you any estimate of the ore that you own, the number of tons of ore?

Mr. Gates: I thought you were investigating the United States Steel. I do not believe I would care to answer that question. I think we are making iron as cheaply as the Tennessee Coal, Iron & Railroad Company.

Mr. Young: Do you know anything about the extent of the Schloss-Sheffield and the Woodward properties in a general way?

Mr. Gates: Yes; in a general way. I look at their statements pretty carefully, and the maps of their iron ore and coal, and try to find out all I can about it. The Schloss-Sheffield have about 125,000 tons of pig iron piled up down there.

Mr. Young: That they cannot sell?

Mr. Gates: They have not sold it; at least, they have that much there. It was 132,000 at the last report we had.

The Chairman: Going back to the original transaction, the Trust Company of America needed \$10,000,000. They had a great number of securities of the Tennessee Coal, Iron & Railroad Company held as collateral. They consented to transfer that collateral from the Tennessee Coal, Iron & Railroad Company to the United States Steel Corporation in an exchange of stock?

Mr. Gates: You are mixed. Mr. Thorne, the president of the company—I happened to be a stockholder at that time in the trust company—told me that he applied to the clearing house for \$10,000,000, and that the clearing house committee sent over a committee to examine the assets under his loans, and that they claimed to him that he had too much Tennessee Coal & Iron. Mr. Thorne was in this syndicate that bought the property. The trade was made by L. C. Hanna and Grant B. Schley, not by Mr. Thorne or by the Trust Company of America.

The Chairman: I have gathered that the bank could not get the money until there was a transfer made of this stock from one company to another. Is that true?

Mr. Gates: I do not know about that. The Trust Company of America, I think, paid out over \$56,000,000. The run started on them before I left France, starting in October, and it continued long after they got their ten million dollars. I think it continued until probably January before it stopped—December, anyway.

The Price of Rails

The Chairman: You were speaking of the facility for assembling ores of the Tennessee Coal, Iron & Railroad Company, and of getting an extra price for rails. If you had continued in business there, and had perfected your rail plant, with your facilities for assembling ore, and with the demand for open hearth rails, could the United States Steel Corporation or any other concern have dictated the price of rails to you or to your concern?

Mr. Gates: My opinion would be that we would have been in the saddle in that territory. But where it is a question of rail transportation, \$2 or \$3 a ton, we might have been at a disadvantage. But in that immediate territory we would have had the advantage.

The Chairman: What is the price of steel rails now; what are they quoted at?

Mr. Gates: I think open hearth rails are quoted at \$29 and \$30, and the Bessemer \$28.

The Chairman: How long has that price remained unchanged, if it has remained unchanged?

Mr. Gates: Before the Sherman anti-trust law took effect there was a rail pool, away back in 1884, '85 or '86, and that rail pool established a price on rails at that time, I think, of about \$35. The price has varied between \$35 and \$15. The time the pool was knocked out, years ago, there was a fight, and then they would get back together. Then the Sherman anti-trust act rather stopped this pool.

ing business and the price of rails has been nominally, I think, about \$28 for most of the time for ten or twelve years.

The Chairman: You have not any idea what per cent. of the rails are made by the United States Steel Corporation?

Mr. Gates: No, I have not.

The Chairman: You spoke of the price of rails having fluctuated.

Mr. Gates: Not much in twelve years.

The Chairman: Prior to the last twelve years they fluctuated, as you said, running from \$16 or \$17 up.

Mr. Gates: I was at the head of the Illinois Steel Company for several years, and during that time we had a rail fight. The price was \$23 one day, the next day it was \$18, and the next day it was \$15.

The Chairman: To what do you attribute this sudden stability in the price of rails for the last ten years?

Mr. Gates: I am not a rail maker, and am not competent to answer that question.

Handling Lake Superior Ores

The Chairman: Do you know what distance Lake Superior ores are brought, and over what lines?

Mr. Gates: I think the average haul is from 30 to 100 miles, in Minnesota, and that ore is hauled by three railroads, the Eastern Minnesota, which is owned by the Great Northern; the Duluth & Iron Range, and the Duluth, Missabe & Northern, these two owned by the Steel Corporation.

Mr. Bartlett: You spoke about the Great Northern owning ore in that range. Is it not a fact that the Steel Corporation has entered into a contract with the Great Northern Railroad to purchase all their ore for years? And, while the Northern Railroad owns them, the United States Steel Corporation controls the output, and will for years; is not that a fact?

Mr. Gates: No, sir, that is not a fact. The Minnesota Eastern Railway is owned by the Great Northern Railroad. The Great Northern Ore Company has sold its ore to the United States Steel Corporation. But it does not necessarily mean that that ore is to be moved over the corporation's railroad. Most of the ore acquired by the steel corporation from the Great Northern Ore Company lies contiguous to the Eastern Minnesota Railroad, and that ore has been sold, as Mr. Hill informs me, at a price f. o. b. boats Lake Superior ports, and the freight rate gets no bigger. Any ore hauled over the Duluth & Iron Range, or the Duluth, Missabe & Northern pays an 80-cent freight rate.

Mr. Young: Do you know anything about the terms of that contract, whether it is a direct sale, or somewhat in the nature of a lease which can be thrown up?

Mr. Gates: I think it could have been thrown up up to a certain time, but I think that time has expired. I think it is now a lease in perpetuity.

The Chairman: You spoke of an 80 cent freight rate. What is the distance of that haul?

Mr. Gates: Seventy to 100 miles, I think.

The Chairman: What do they charge you a ton to haul that iron a mile?

Mr. Gates: It is about a cent a ton a mile. Coal and coke and ore, I think, are in about the same class. Ore can be handled more cheaply. Ore is generally handled in what they call hopper-bottom cars containing fifty tons or more. That ore is dropped into the car from the chute, and the car is unloaded by running it out on the trestle and dropping out the bottom. Coke is put into the cars, and if it is in box cars, they have to board up the sides, and they have to do it by hand, so it costs a good deal more money to load it and a good deal more money to unload it.

The Chairman: Is not coke carried over a good many of those roads in this country at 3 mills per ton mile?

Mr. Gates: I think so; I think it has been carried at less than 3 mills.

Early Wire Mill Consolidations

The Chairman: Mr. Gates, you were connected at one time with the Consolidated Steel & Wire Company of Illinois, were you not?

Mr. Gates: Yes, as general manager, director and member of the executive committee. It was formed in 1892 or 1893, I guess. I had no bonded debt. I think it had about four million capital issued. We were young and ambitious, and as fast as we got a little money we bought another property.

The Chairman: What other property?

Mr. Gates: Forty or fifty, I should say, one by one, beginning with the Washburn & Worcester Wire Company, in Worcester, Mass., and extending to San Francisco. They were not necessarily acquired by the Consolidated. Most of them were acquired by I. L. Elwood, recently deceased, and myself; but they were amalgamated

eventually into the American Steel & Wire Company.

The first wire corporation I was interested in was the Southern Wire Company, about 1880, in St. Louis. Then we acquired the St. Louis Wire Mill Company, and we built a concern near Pittsburgh called the Braddock Wire Company. We operated those concerns separately in the early eighties. Later on we acquired a controlling interest in the Lambert & Sheffield Wire Fence Company, Joliet, Ill., and one or two other companies, and then we formed the Consolidated Steel & Wire Company of Illinois.

The Chairman: What was the value of that property?

Mr. Gates: The Consolidated Steel & Wire Company went into the American Steel & Wire Company of Illinois at about \$200 a share, perhaps a little less. The American Steel & Wire Company of Illinois was merged into the American Steel & Wire Company of New Jersey, which took over all the companies. Those companies in the meantime were generally purchased by Mr. Elwood and myself for cash and turned in at what we paid for them. We never attempted to make a dollar out of any purchase, directly or indirectly.

The Chairman: The American Steel & Wire Company was capitalized at what?

Mr. Gates: \$40,000,000 preferred and \$50,000,000 common. At the time of its first consolidation the American Steel & Wire Company of Illinois, which was afterwards turned into the American Steel & Wire Company of New Jersey, was capitalized at \$24,000,000.

The Chairman: Speaking approximately, do you remember what was the average price of barb wire, the kind used by the farmers as fencing, for the three years preceding the formation of the Consolidated Company?

Mr. Gates: I cannot keep those prices in my head. I started selling barb wire in 1874 at 20 cents a pound. We sold the same class of wire later at 1.7 cents a hundred. There is the price, between \$400 a ton and \$34.

The Chairman: What was the effect on the price of wire nails, and the other products in the American Steel & Wire Company? Was there any variation in price after its formation, immediately succeeding the formation of the American Steel & Wire Company, just prior to its sale to the United States Steel Corporation?

Mr. Gates: I do not believe there was much change. We tried to run the mills we could operate the most economically, and shut down those that were the most expensive; and I do not think we particularly advanced the price. That is my recollection. Two-fifths of the properties were probably dismantled, shut down and eventually dismantled, or concentrated. The machinery had been moved to our other plants; the machinery was not wasted.

Mr. Bartlett: Employees in Boston or in California when the plants were dismantled did not follow up and get employment at these consolidated plants?

Mr. Gates: Not all of them, but it is safe to say that about 90 per cent. of the wire workers would follow the plants, the skilled men.

The Chairman: What was the approximate cost per ton for barbed wire such as is used for fencing in 1900, do you know? I do not ask to the cent, but approximately.

Mr. Gates: They were making today probably 10 or 15 per cent. on their output. If you get the selling price and take 10 or 15 per cent. off you will get about the cost price.

The Chairman: What was the basis of exchange of stocks between the American Steel & Wire Company and those of the United States Steel Corporation at the time the corporation took over the American Steel & Wire Company?

Mr. Gates: I think we got \$46,800,000 of United States Steel preferred for the \$40,000,000 of Steel Wire preferred; and between \$50,000,000 and \$60,000,000 of common, perhaps a little over \$60,000,000, for the \$50,000,000 common. And yet the Steel & Wire Company went into the United States Steel Corporation at a comparatively lower figure than any other concern.

The Chairman: What percentage of the business did the American Steel & Wire Company own at the time it was acquired by the United States Steel Corporation?

Mr. Gates: I should think we owned 75 to 85 per cent. of the business in wire and its products.

The Chairman: Did the United States Steel Corporation acquire any other properties producing similar products to yours at the time it acquired your property?

Mr. Gates: They acquired later the Union Steel Company, Pittsburgh, which was owned by Mr. Frick and the Mellens, largely, as I understood, I think \$45,000,000. That was a wire plant.

Mr. Young: Was that later than the organization of yours?

Mr. Gates: Yes. Several years later.

Formation of United States Steel Corporation

The Chairman: The United States Steel Corporation was really formed by the merging of nine separate con-

cerns, was it not, Mr. Gates?

Mr. Gates: I do not remember whether there were nine or what they were. There was the Carnegie Steel Company—let me explain. The Federal Steel Company was a holding company. The Federal Steel Company owned the capital stock of the Minnesota Iron Company. The Minnesota Iron Company, in turn, owned the Duluth & Iron Range Railroad. They owned the Loraine Steel Company, of Loraine, Ohio, and the Illinois Steel Company, of Chicago. So that in the turn-in of the Federal Steel Corporation into the United States Steel they really got three separate and distinct corporations, good-sized ones. Then the Carnegie would be four, the National would be five, and the Hoop would be six, the Tin Plate would be seven, the Wire would be eight, the Tennessee Coal & Iron would be nine, the American Sheet Steel would be ten, the American Bridge would be eleven. There were eleven or twelve concerns. The National Tube would be twelve.

Mr. Young: The Illinois Steel Company itself was formed by a consolidation of a number of other companies, was it not?

Mr. Gates: The Illinois Steel Company was formed by an amalgamation of the North Chicago, the South Chicago, the Union, the Joliet and the building of the New South works.

Mr. Young: Did it take in that Milwaukee property?

Mr. Gates: That is the North Chicago Rolling Mill. They had two plants, one at North Chicago and one at Bayview, or South Milwaukee.

Mr. Young: That was really the beginning of the consolidation in the steel business, was it not?

Mr. Gates: I think so, yes. That was about 1888 or 1889.

Mr. Young: Then the next step was the formation of the Federal Steel and the acquisition by it of the Minnesota Iron Company and the Loraine, in addition to the Illinois, was it not?

Mr. Gates: Yes. That came about in this way: Many of the stockholders of the Minnesota Iron Company were stockholders in the Illinois Steel.

Mr. Gates: I thought I saw evidence of an attempt to push up the price of ore, so I went out and acquired some ore properties for the Illinois Steel, which made rather hard feeling between the directors of the two corporations, and resulted in the amalgamation.

Mr. Young: You were connected with the Illinois Steel at that time?

Mr. Gates: Yes, sir.

The Chairman: The companies to which I referred as merged at the time of the formation of the United States Steel Corporation, are the Carnegie Company, the Federal Steel Company, the National Tube Company, the American Bridge Company, the Lake Superior Consolidated Mines, the American Steel & Wire Company, the National Steel Company, the American Steel & Hoop Company, the American Tin Plate Company, and the American Sheet Steel Company. Were there any other companies?

Mr. Gates: No, I think that was all. But there was the Pittsburgh Steamship Company and the American Steamship Company—two lines of steamers on the lakes.

The Chairman: Were they independent concerns, not identified with any of the companies I have named?

Mr. Gates: The American Steamship Company was a concern which I built and had been president of from its start. I think we had 12 ships. The Pittsburgh Steamship Company was built by Henry W. Oliver and Mr. Carnegie and Mr. Frick, and that crowd. It was a pretty important concern. Then there was the Elgin, Joliet and Eastern Railroad; the Chicago, Lake Shore & Eastern Railroad; the Union Railroad; the Duluth Iron & Range; H. C. Frick Coke Company.

The Chairman: Before these carriers were taken over by the United States Steel Corporation were they competing railroads?

Mr. Gates: Yes.

The Chairman: Are they owned absolutely now by the United States Steel Corporation, as part of its property?

Mr. Gates: Yes.

The Chairman: Are they still engaged as common carriers?

Mr. Gates: Yes; they are common carriers.

The Transactions with Mr. Carnegie

The Chairman: Do you know how long negotiations were pending before your companies, the Carnegie Company and the rest of them, became merged in what is now known as the United States Steel Corporation?

Mr. Gates: Well, to go back and give you the history, the price of finished steel became very badly demoralized in 1896 or 1897, and at that time I think Mr. Frick, Judge W. H. Moore, of New York, and one or two colleagues conceived the idea of getting an option from Carnegie

on the Carnegie Steel Company. This was before the formation of the United States Steel. They paid Mr. Carnegie \$1,000,000 in cash for that option; but the demoralization became so great in the iron and steel business that it was not possible for Mr. Frick, Judge Moore and colleagues to put it through, and they had to forfeit that \$1,000,000.

The Chairman: What was the amount of the option?

Mr. Gates: I think it was \$160,000,000. Then came the Loraine and Federal. The Federal Steel Company was formed by the acquisition of the Loraine and the E. J. & E. Railroad, which was owned by Morgan and friends and the Minnesota Iron and Illinois Steel; and they became the Federal Steel Company. The Federal Steel Company was formed in 1898, and in 1901 became part of the United States Steel.

The Chairman: Prices became stable, or at least more stable, along about 1896 to 1897, did they not?

Mr. Gates: I think they got worse at that time. Along about 1898 or 1899 they got better. In 1901 they were very good.

The Chairman: The United States Steel Corporation was formed about 1901, was it not?

Mr. Gates: It started in 1900 and finished in 1901.

The Chairman: At that time was there any danger of a second demoralization in prices on account of the attitude of Mr. Carnegie toward the rest of these concerns? I believe up to that time a great many of them had been getting certain products from him, and manufacturing certain products themselves. In other words, along in 1898 or 1899 the Federal Steel Company had its orbit or its scope of activities pretty well defined, did it not, and the other companies in the same way. Each had its own sphere of operations? They did not impinge one upon the other to any great extent?

Mr. Gates: Well, I would have to explain by making a statement. Mr. Morgan along about 1899 or 1900 organized the National Tube Company, by the acquisition of the stock of the National Tube Company just out of Pittsburgh, and the Riverside Steel Company, near Wheeling, and two or three more tube concerns; and they were making a good deal of money in the manufacture of tubes. Mr. Carnegie took it into his head that he would build a railroad from Lake Erie points—from some point on Lake Erie to his various works around Pittsburgh—and that he would also build a tube works; and he proposed to build this tube works, if my memory serves me aright, at Ashtabula, Ohio, where a great deal of the ore is unloaded. James J. Hill and Mr. Morgan had dined together and Mr. Morgan had expressed to Mr. Hill the fear that if Carnegie went into the building of railroads he would demoralize the entire railroad situation as he had demoralized the steel situation; and that if he built a tube works at Ashtabula it would result in a demoralization of the prices of tubes. Mr. Morgan had just put the National Tube Company together. Mr. Hill suggested to Mr. Morgan that he talk to me. Mr. Morgan said that we were not very friendly, and he asked Mr. Hill to come over to see me, and see if I would meet him. I had a talk with Morgan, and he asked me how I would suggest we could stop Carnegie from building this railroad and building this tube works; and I told him in my opinion there was only one man to talk to that had any influence with Mr. Carnegie, and that was Charles Schwab. He wanted to call in Frick. I called Mr. Schwab up in Philadelphia, and he dined with me at the Manhattan Club, and we went up to Mr. Morgan's house about nine o'clock in the evening. We discussed the possibility of pouring oil on the troubled waters and saving the situation. I think Mr. Schwab and I stayed there until about six o'clock the next morning. When we left a tentative plan had been drawn up for the purpose of getting the various corporations into one concern.

The Chairman: I do not want to interrupt you, but the one concern to which you referred was the embryonic United States Steel Corporation?

Mr. Gates: The United States Steel Company. Judge Moore and Mr. Frick felt very sore over the \$1,000,000 that they had paid to Carnegie, for which they got nothing. Schwab stated that Mr. Carnegie would agree to anything he would suggest. He pulled a letter out of his pocket and showed it to Morgan and me, showing that he had a contract with Carnegie to pay him \$1,000,000 a year for five years. We went on and laid out the plan of the United States Steel Corporation without consultation with Frick, who was a large owner.

Judge Moore got hold of Carnegie, I was told, and said to Carnegie: "If you are going to take bonds in payment of your property, make these bonds cover the National Steel Company as well as your own." Now Mr. Carnegie demanded that of Morgan, and it enabled the National Steel Company, in my opinion, to get \$50,000,000 more for their property than it was worth, because Carnegie would not turn his over unless they had a mort-

gage on the National, and the rest of us had to suffer. That is about the history of the United States.

The Chairman: How long was it from the time you got started until this industrial accouchement actually occurred?

Mr. Gates: It was sixty days, I should say, or less—maybe forty days. We worked pretty fast. I think they drew up the articles of incorporation for the United States Steel Corporation originally for \$10,000, and then they gradually extended it as necessity arose. As each concern came in they would increase a few million or hundred million.

The Chairman: Mr. Carnegie, I believe, got \$320,000,000 in bonds, did he not, for his property—for the Carnegie Company?

Mr. Gates: He got \$320,000,000 for what he had offered at \$100,000,000 or \$160,000,000 the year before, and got \$1,000,000 forfeit.

The Chairman: Do you remember the suit between Frick and the Carnegie Company?

Mr. Gates: Very well.

The Chairman: Is that the same property that was mentioned in that answer, that sworn reply, as being worth, according to book values, about \$76,000,000?

Mr. Gates: I think that is the same.

The Chairman: The same property that was sold for \$320,000,000 in bonds?

Mr. Gates: It was \$320,000,000 for Mr. Carnegie's interest. It was nowhere near a hundred per cent. interest. I think the basis of the Carnegie Steel Company was in the neighborhood of \$500,000,000.

The Chairman: Do you own any of the common stock of the United States Steel Corporation?

Mr. Gates: Yes, sir.

The Chairman: Do you consider that there is any real, tangible value behind the common stock?

Mr. Gates: I decline to answer.

Side Lights on Cost of Steel Production

The Chairman: What was the effect of the formation of this concern as to the competition between its component parts? Was there any competition between them after that possible?

Mr. Gates: I would not think there would be. I have never heard of any.

Mr. Bartlett: I was going to ask you whether or not, about the time of the consolidation, steel rails were not about \$17.50 a ton, and after the consolidation they went to \$28 a ton?

Mr. Gates: The price of steel rails in 1900, if my memory serves me aright, was about \$28, and they are \$28 to-day.

The Chairman: Were steel rails ever made in this country at a cost of, say, from \$12 to \$13 a ton?

Mr. Gates: Yes; I think Carnegie and the Illinois Steel Company made rails at approximately \$13, or less. They made that based on a very low labor cost, on very low prices for iron ore; they made it based on \$1.90 for iron ore delivered at South Chicago which to-day is selling for \$4 and \$4.50. They made it on 85 or 87½-cent coke which is to-day selling at \$1.50 to \$1.60. So that you must not attempt to confuse the prices of to-day with the prices along in 1896 or 1897, when everything was in a thoroughly demoralized condition. At that time the labor of the sailor gang around the mill, which is the roughest about labor, was about 9 cents an hour. To-day it is about 18 or 20 cents an hour.

Mr. Young: Do you know what the cost of the labor was of the men in the Lake Superior district where you were getting that cheap ore?

Mr. Gates: About 40 per cent. of what it is now, I would say.

The Chairman: Has there been any marked improvement in plant and machinery—plant and apparatus necessary for the manufacture of rails—between that time and this? I refer to the capacity of the furnaces, and the like.

Mr. Gates: Yes; there are improvements every year, and probably will for many years to come. Some years the improvements cut off quite an amount per ton. Some years they cut off only a few cents. In 1896, 1897, and 1898 we had one blast furnace at Chicago, No. 7, I think, which made somewhere from 500,000 to 800,000 tons of pig iron without relining, running two or three years. No. 6 or No. 5, adjoining it, probably had to be relined half a dozen times during that time. There is a good deal of luck in running blast furnaces, as well as science. I do not know of any marked improvement in blast furnace practice in ten years—not a marked improvement. There has been a little.

Transportation from the upper lake ports is the same to-day as it was fifteen years ago—80 cents on the ton; so you cannot say that there is an improvement there, because the cost of transporting is the same. Twelve years

ago, I think, we decided to build four boats for lake transportation of ore: The James J. Hill, the William Edensor, the I. L. Ellwood, and the J. W. Gates. We built those boats about 500 ft. on the waterline, and 31 or 32 ft. in the molded hold to carry about 9,000 to 10,000 tons of ore. The old people on the lakes told us that we had built such large boats that we never could operate them successfully. Now they are building boats 610 ft. in length, which will carry 20 to 30 per cent. more ore than those that we built 12 years ago. Of course the larger you get the unit the cheaper you can transport everything.

The Chairman: There has been a general reduction, not in the price to the man who has to use these things, but a general reduction in the actual cost of transportation from the ore beds to your furnaces, has there not?

Mr. Gates: Everything except labor, which has gone up about 75 to 100 per cent.

The Chairman: Have the improvements in methods of manufacture and in the facilities for transportation compensated you for the increased labor cost?

Mr. Gates: No, sir. We cannot produce a ton of pig iron to-day within \$2 or \$3 a ton as low as we could back in the nineties. I think they produced a ton of pig iron at Birmingham at \$6 a ton. They cannot do it to-day at approximately better than \$9.

The Chairman: Would you say it costs you \$3 more to produce a ton of steel rails now than it did in 1890?

Mr. Gates: From \$3 to \$8 more. Labor has entered enormously into the cost.

Mr. McGillicuddy: Is it true that in this development from year to year your labor has become more productive and efficient?

Mr. Gates: Scientific labor generally improves from year to year, but common labor has not changed much.

Mr. McGillicuddy: What is the cause of the increase in the cost of labor?

Mr. Gates: Well, I do not think we get as good labor to-day at the mills as we did 10 or 20 years ago. We get more of the foreign element.

Mr. McGillicuddy: You say you do not get as good labor to-day, and not as productive, and you are paying more for it?

Mr. Gates: I should say 70 per cent.

Mr. McGillicuddy: What is the cause of that increase?

Mr. Gates: I do not believe I want to answer that.

The Chairman: Mr. Gates, I want to call your attention to an article that appeared a short time ago, by Mr. Berglund, in his History of the United States Steel Corporation. He says, speaking of the consolidation of these various concerns, into the United States Steel Corporation, and other allied concerns: "That the consolidations of the time were a factor influencing prices can be seen in the cases of the American Tin Plate and the American Steel and Wire Companies. These companies had something of a monopoly of the market in their respective lines; and this monopoly was reflected in the prices of the period. Shortly after the organization of the American Tin Plate Company, in December, 1898, the price of coke tin plate (14 x 20 in.) was raised from \$2.70 per 100-lb. box to \$3 at mill. Quotations in the leading centers of trade in the northeastern part of the country were upward of \$3.20 per 100-lb. box. During February, 1899, the average price was \$3.55. By the end of the year it was \$4.84, and it remained at this figure during a large part of the following year. In like manner, after the organization of the American Steel & Wire Company, there was a great rise in prices. Wire rods which sold for \$20 to \$22.50 per ton in 1898 were quoted at steadily increasing prices during 1899. By January, 1900, the price had reached \$50 per ton. Wire nails, which had been quoted at \$1.40 to \$1.50 per 100-lb. keg in 1898, were steadily raised in price during 1899 until they were quoted at \$3.20 in the early months of 1900—a higher figure than that reached under the regime of the notorious wire-nail association of 1895 and 1896." Now, to what do you attribute that sudden rise? Is that statement of the oscillation of prices by Professor Berglund correct, approximately?

Mr. Gates: I do not remember anything like the details. Nails went up along in 1895 or 1896 to about \$3, under some kind of manipulation, and then I think they went up to about \$3 again; but I do not remember what the facts were.

The Chairman: That was due, I presume, in great measure to the facility enjoyed by these associated concerns in coming to a price and in holding it there?

Mr. Gates: Well, I assume a good many of the smaller manufacturers got scared when they saw the big concern and they came in and sold out at any figure they could get, fearing that they were going to be wiped out; and the contrary thing happened and the prices went up instead of down. I do not remember, but I am giving you my offhand theory.

Personal

A. I. Findley, editor of *The Iron Age*, sailed for Europe May 27, to be gone two months.

O. J. Abell succeeds Roy F. Soule as Western editor of *The Iron Age*, with headquarters at Chicago. Mr. Abell is not new to duties of this kind, as he has had long experience in a similar capacity with another journal. Mr. Soule continues his connection with the David Williams Company in another branch of its business.

W. J. Linton, who for the past six years represented Wickes Brothers as their Philadelphia branch manager and more recently as their engineering salesman for power plant equipment in New York City, has severed his connection with that firm and has opened an office at 136 Liberty street, New York, as manufacturers' agent and dealer in new and second hand steam and electric power plant equipment, air compressors, hoisting engines and modern machine tools.

Charles E. Taylor, who was formerly in the engineering department of the American Telegraph & Telephone Company, has joined the New York selling force of the National-Acme Mfg. Company, Cleveland, Ohio.

William Jaeger, New York manager for the German machinery selling house of Alfred H. Schutte, sailed May 26 for Europe, to be absent about four weeks.

J. D. Lyon, formerly manager at Cincinnati, Ohio, of the Westinghouse Machine Company, has resigned to accept a position as manager of the commercial department of the Union Gas & Electric Company, Cincinnati. He had been connected with the Westinghouse Machine Company at Pittsburgh, Pa., and at Atlanta, Ga.

Andrew Carnegie sailed for Europe May 24 on the Oceanic.

Geo. E. Day, secretary and general sales manager of the Youngstown Sheet & Tube Company, Youngstown, Ohio, has returned from an extended stay at Pasadena, Cal.

F. A. Ogden, general freight agent of the Jones & Laughlin Steel Company, Pittsburgh, will be elected president of the Traffic Club of Pittsburgh at its annual meeting to be held early in June. Mr. Ogden has received a unanimous nomination for the office.

Obituary

J. F. KISSICK, for more than a quarter of a century in charge of the foundry department of the Columbus Iron Works, Columbus, Ga., died May 11, aged 64 years. The works closed as a tribute to his memory on the day of the funeral. He was a native of Pennsylvania, and it is interesting to know that his mother, who resides in Philadelphia, has attained the great age of 103 years and is reported to be in good health at this time.

AUGUSTUS WESSEL, Cincinnati, Ohio, died May 25, aged 79 years. He was president of the Cincinnati Railway Supply Company and had been connected with the iron and steel business for a number of years. He was a director of the Ohio Valley National Bank when that institution was absorbed by the First National Bank and was a member of a number of different Cincinnati clubs. He leaves a widow, two sons and one daughter.

A. FRED HAMNETT, Boston, Mass., for 18 years local manager for Frank D. Moffat & Co., New York, died May 23. He was born in Malden, Mass., in 1864. He began his business career as a boy, and became widely known in the iron and steel trade of New England. He leaves a widow.

The Canadian Wire Rod Trade.—At the annual meeting of the Dominion Steel Corporation held in Montreal May 19, President Plummer said in part: "While we will lose considerable by the suspension of the bounties on wire rods, we will not lose anything like as much as the bounty. We will sell more pig iron than we are doing at the present time and will engage more extensively in the manufacture of rails and other products. In addition, we are installing machinery and building plants for the manufacture of wire and nails, which will equalize matters. Notwithstanding this, he added, part of the plant now used in the manufacture of wire rods will be closed down, as the company, without a bounty, cannot compete with British and United States manufacturers in the sale of rods to Canadian users.

Coal Analysis by Consumers.—That coal analysis by the large public service corporations is a detail of plant management of potential annoying proportions is indicated in the methods which have perforce been developed by the Edison Electric Illuminating Company, Boston, Mass. For coal shipments of 750 tons and less, a selection for sampling of about 1000 lb. is made, and for larger shipments correspondingly larger samples are taken, amounting to perhaps 3000 lb. for shipments of 4500 or 5500 tons. The subdivision of the samples for ascertaining the heating value of the coal is made in a usual way. Analyses are also made to determine the sulphur content of the fuel as an indication of the presence of elements likely to cause clinkering. Instead of a two days' determination, commonly regarded as necessary, the residue in the calorimeter is washed into a measured volume of water and barium chloride is added, precipitating insolubles, and forming a solution of barium sulphate, which in a special apparatus gives a direct reading of the amount of sulphur present.

The Orient Coke Company.—Stockholders of the Orient Coke Company held their annual meeting in Uniontown, Pa., May 25, at which former directors were elected for the ensuing year as follows: Julian Kennedy, Pittsburgh; Robert Bentley, T. F. Woodman and David Davis, Youngstown, Ohio; Reid Kennedy, Homestead; Joseph W. Kennedy, Pittsburgh, and O. W. Kennedy, Uniontown. Mr. Bentley is president and Mr. Davis is secretary of the Ohio Iron & Steel Company, operating Mary furnace at Lowellville, Ohio. At a later meeting of the board, the following officers were re-elected: Julian Kennedy, president; Robert Bentley, vice-president; Reid Kennedy, secretary and treasurer; R. M. Fry, assistant secretary and treasurer, and O. W. Kennedy, general superintendent. The Orient Coke Company has been very successful since its organization, a quarterly dividend having been paid regularly since operations began. The company has 480 coke ovens, of which 260 are in blast.

The machinists' strike in New York and Hudson County, N. J., for an eight-hour day, which was declared May 1, has developed into a stubborn contest. While many of the 16,000 men who went out at the order of the union leaders have drifted back to the shops, the picketing has become more vigorous, and the special policemen in the employ of the companies affected are more in evidence. Of the 100 shops affected, 40 are now operating on full time. All of the manufactories operated by members of the National Metal Trades Association are in operation except one, and that plant is closed down through the choice of the owner who is moving his shop from New York to the Bush Terminal at South Brooklyn. Other manufacturers, who have equipment enough made to supply the existing demand, have chosen to keep their places closed for the time being.

The Art Brass & Fixture Mfg. Company has been organized with Pittsburgh capital to take over the plant of the Star Enameling & Stamping Company at McKees Rocks, Pittsburgh, in which a foundry and brass working plant will be established. The company is capitalized at \$100,000 and has applied for a charter and is installing machinery and altering the plant with a view to beginning operations July 1. L. M. Fluhart, of Conneaut, Ohio, is president and will manage the plant. L. R. Jefford of the Union Trust Company is secretary and treasurer.

The Crescent Forgings Company, Hulton, Pa., near Pittsburgh, manufacturer of Cresco pipe wrenches, drop forgings, etc., has purchased the business of the G. R. Lang Company, Meadville, Pa., maker of patented tool holders, and is arranging to move the machinery required in their manufacture to its own plant, where it proposes to make this specialty in larger quantities than heretofore. G. R. Lang will be the sales representative for the Crescent Forgings Company in this new department.

To take care properly of its rapidly increasing concrete mixer business, the Standard Scale & Supply Company, Pittsburgh, Pa., manufacturer of the Eclipse concrete mixer, has found it necessary to increase the size of its large plant at Beaver Falls, Pa., by the addition of a steel fire proof building 70 by 80 ft., for which the machinery has already been purchased and installed.

The Salary Loan Evil

In the campaign to improve loaning conditions to clerks and other wage earners in cities, the conference on the "loan shark" evil, held in New York City May 18 under the joint auspices of the Russell Sage Foundation and the Merchants' Association of New York, was a marked success. It has enlisted the interest and support of large employers of labor, of whom about 75, the number invited, attended in person or were represented. The conference was presided over by Henry R. Towne, president of the Merchants' Association of New York. The various phases of the salary loan problem were ably discussed in brief addresses. The thorough consideration given the subject is indicated by the following programme of the conference:

"The Salary Loan Problem—Its Extent and Effects." A. H. Ham, agent Russel Sage Foundation.

"The Present Legal Situation." Walter S. Heilborn, Gallert & Heilborn.

"Attitude of Employers Toward Assignment of Wages." Isidor aus, K. H. Macy & Co. C. D. Meeneely, Vice-president and Treasurer Brooklyn Rapid Transit Company. Jacob Gimbel, Gimbel Brothers.

"Legislative Regulation." Ansley Wilcox.

"Co-operative Loan Associations—The Salary Loan Remedy." Pierre Jay, Vice-President Bank of Manhattan Company. Edward E. Pratt, New York School of Philanthropy.

After the addresses a general discussion ensued, which was followed by the unanimous adoption of four resolutions embodying the following recommendations:

1. That employers rescind rules of discharge in order to assist employees in resisting unreasonable interest charges and deprive money lenders of the power of extortion.

2. That all employers disregard claims filed by money lenders against the wages of employees not in direct compliance with law, the employers to interest themselves in assisting employees involved with loan sharks.

3. That in self interest as well as for the benefit of their employees all large employers of labor encourage and assist in the creation of co-operative savings and loan associations in their respective establishments.

4. That laws be enacted which will allow a reasonable rate of interest on all small loans and provide for the licensing of money lenders and the efficient supervision and control of such licenses, preferably under the supervision of the State Banking Department.

Brown & Zortman Machinery Company Fire.—Last week the warehouse of the Brown & Zortman Machinery Company on Liberty avenue, Pittsburgh, was badly damaged by fire, but the company advises that it is doing business as usual and that the fire will not interfere with shipments. The loss was fully covered by insurance. For the next few months the business will be located at 2835 Smallman street, Pittsburgh. The company desires the trade to understand that there will be no delay in shipments, but that orders will be taken care of promptly as usual.

Improvements recently completed or now under way by the National Brake & Electric Company, Milwaukee, Wis., include a 200-ft. addition to the steel foundry, a 200-ft. addition to the machine shop, a 100-ft. concrete testing house and a new blacksmith shop and carpenter shop. The equipment installed in these additions includes a 106-ft. span gantry crane and about \$100,000 worth of machine tools. These improvements were necessitated by the rapidly increasing demand for the gasoline locomotive which the company is building and which is becoming very popular in coal and iron mines, lumber camps and industrial plants.

On June 1 the Sprague Electric Company merged with the General Electric Company, Schenectady, N. Y. Its business will be conducted under the name of Sprague Electric Works of General Electric Company. The manufacture and sale of the lines of apparatus and supplies heretofore exploited by the Sprague company will be continued under the same organization, with D. C. Durland in responsible charge as general manager. All correspondence should be sent to the Sprague Electric Works at the same address as in the past. Bills and statements will be rendered from the Sprague Electric Works, 527 West Thirty-fourth street, New York, where all remittances should be made.

The Society of Automobile Engineers announces that at its summer meeting at Dayton, Ohio, beginning June 15, papers will be presented on the following subjects: "The Question of Long versus Short Stroke Motors," by Justus B. Entz; "Long Addendum Gears," by E. W. Weaver; "Elements of Ball and Roller Bearing Design," by Arnold C. Koenig; "Worm Gears and Wheels," by E. R. Whitney; "Rotary Valve Gasoline Motors," by C. E. Mead; "Oversize Standards for Pistons and Rings," by James N. Heald; "Some Points on the Design of Aluminum Castings," by H. W. Gillett.

Orders for considerable equipment have recently been placed by the Pennsylvania Railroad Company to be built at its shops at Altoona, Pa. Included in these contracts are 12 shifting locomotives, 52 freight locomotives, 13 passenger locomotives, 55 passenger cars, 10 passenger and baggage cars and 16 passenger, baggage and postal cars, the last named being for the West Jersey & Seashore Railroad electric service.

The Lake Superior Iron & Chemical Company, Detroit, Mich., will erect a new chemical plant at Manistique, Mich. The old plant at that place has been dismantled and shipped to Elk Rapids and Ashland, Mich. The new buildings will be constructed of steel and concrete. The chemical building will be 87 x 187 ft. and the retort building 160 x 400 ft. The improvements will cost \$250,000 and will change the company's methods of making charcoal from kiln to retort system.

The St. Lawrence Bridge Company, Montreal, to which the contract for the superstructure of the Quebec Bridge was awarded, is now arranging for the establishment of an assembling plant at the bridge site near Quebec.

Greenlee Bros. & Co., wood working machinery and tools, have transferred their general machinery sales office from Chicago to Rockford, Ill., owing to the fact that their entire plant is now being operated in Rockford, and all manufacturing by them in Chicago has ceased.

The Ellwood City Forge Company, Ellwood City, Pa., has increased its capital stock from \$25,000 to \$100,000 and will make some large additions to its plant.

Notices have been posted at all the coke plants of the H. C. Frick Coke Company in the McConnellsville region, effective at once, that firemen, pumpers and compressor, fan and dynamo men will be required to work only six days per week in the future. The order applies to about 500 men.

The Ohio Valley Brass & Iron Company, a new incorporation, proposes to build a plant at Mingo Junction, Ohio, to make brass and iron castings.

The Hamburg-American Steamship Company, it is announced, has given orders for the construction of a sister ship to the mammoth turbine steamer Imperator, now building. The vessel will be 890 ft. long and will be placed in the New York Service.

P. J. McArdle, president of the Amalgamated Association of Iron, Steel and Tin Workers, and James H. Nutt, secretary of the Western Bar Association, have agreed upon June 6 as the time for the conference at Cambridge Springs, Pa., to fix the bar iron scale.

F. B. Swindle, Racine, Wis., has built and equipped a factory and will engage in the manufacture of farm and marine gas engines.

The Forter-Miller Engineering Company, Hartje Building, Pittsburgh, Pa., is completing the erection of three continuous heating furnaces of 100 tons capacity each for Dilworth, Porter & Co., Ltd., Pittsburgh.

A Constitutional Compensation Law

A Discussion of Feasible Methods of Attacking the Problem to Produce an Equitable Statute Which Will Stand the Test of the Courts

BY FRANK F. DRESSER, WORCESTER, MASS.*

The last four years have seen the opening and closing of the debate upon the justice of our present system of law governing industrial accidents, and it is no longer questioned that, to use the words of any one of the dozen commissions that have lately been investigating this subject, our present system is wasteful, slow, unjust, inapplicable to modern industrial conditions and provocative of ill feeling between employer and employee. The query now is what system shall replace it?

If one were to phrase shortly the desire of the employee it might be that injuries should be treated as a necessary incident of work, that when they happen relief should come speedily while the need of relief is pressing, should come certainly and without diminution by costs of collection, and that, in the adjustment of such matters, the employee might deal directly with his employer. And if one were to state the feeling of the average employer, it might be that the interruption of business by investigations and trials and the gamble of uncertain verdicts should be avoided, and that, if he has to pay for injuries, the payments may be as definite and computable as possible so that this expense can be treated, as it never has been, as a cost of production, capable of reduction by good management and of recoupment in the price of his products.

The community as a whole is interested in a system which will tend to prevent the injured workman or his family from becoming a charge on the charities of the community, which will improve the relations between employer and employee and, above all, will conserve, the worker and thereby increase our prosperity.

The ends desired are so nearly the same and are so advantageous to all concerned that it would seem strange if a workable and satisfactory solution could not be reached.

Accidents Are Inevitable

However safely a business, whether of the hazardous class or not, may be conducted by the installation of approved safety devices, by safer methods of work, and especially by the training of the employee to do his work in a skillful and safe manner, it will always be true that the speed and powerful agencies of modern industry will cause accidents and that the individual will never be able to work without fatigue, or momentary forgetfulness or recklessness, and thereby bring injury upon himself. This "contributory negligence" is as much a part of the conduct of business, and, in a practical sense, as unavoidable, as any other of its incidental risks.

Roughly, barely 12 per cent of work accidents are due to the fault of the employer or of some representative for whose acts he is responsible and for which the employee may recover at law. Probably 55 per cent. are due to the inevitable risks of the business, 25 per cent. to the frequently forgivable fault of the employee, and the remaining 8 per cent to fellow-servants or other causes for none of which can there be recovery; yet the loss occasioned by one cause is as great as by another and the employee's need of relief is as great. Yet now but one in perhaps 18 receives any payment whatever, and the payments are usually small and obtained only after delay and expense.

To-day out of every \$100 of premium paid to an insurance company about \$50 is used by it in expenses of investigation, litigation, administration and in dividends, and of the remaining \$50 paid over to the injured person about one-half is again lost in his own expenses of doctors and lawyers. Even where a business carries its own risks the waste is not much less. Every accident must be investigated and legal and medical advice sought by both parties.

Such a condition is inevitable where the basis of recovery rests not on the fact of injury in the course of

employment simply, but on the determination whether the injury was due to the fault of the employer or of some representative. To determine that issue requires skillful investigation by both parties into the circumstances of the accident and it can only be finally decided by a trial with its attendant delay and cost. The chances of such a trial are largely in favor of the employer, yet there is always the possibility of a verdict of a jury which may seriously embarrass him. Under such a system the smaller or less stable employer is forced to insure, for he can never tell when an accident will occur or what it will cost, and insurance is his only means of protection.

The Uncertainty of Accident Cost

This uncertainty of accident cost is crushing to the employee, but it is almost as bad for the employer. The employer may think that his accident costs are now certain, that he pays his insurance premium and that is all. But this happens in practice not to be all. He gives something in charity to help out the employee to whom the insurance company is not required to pay anything; he finds that some condition of his policy has been violated and the company disclaims or the accident exceeds the policy limit and he contributes to its settlement. He forgets, too, the interruption of business by the investigation of the causes of the accident and the loss of time of his employees when the case is tried. He bears, too, his share of the loss to the community through the disabling of trained workers and the expenses of courts and charities.

Nor does the present system tend to prevent accidents. The very uncertainty of cost leads the employer to gamble on the question of his liability; it seems easier to cure or escape than to prevent. Too often the employer having paid his insurance premium dismisses the matter of accidents from his mind and devotes his energies to the other elements of his business. Accident cost is not commonly treated as a cost of production.

It no longer needs a Pittsburgh Survey to prove the inevitableness of work accidents and the loss to employer, employee and community caused by them. Yet hazardous and non-hazardous businesses must be conducted, and the employer must venture his capital and the worker his life and limb in them.

There can be little dispute that a system which shall equate these necessary losses so that the community, which has the ultimate benefit of successful industry, shall bear the burden of them, and not, as now, cast them upon that portion of the community which is least able to bear or recoup them, is a result devoutly to be desired. It is noteworthy that, while there are doubtless many other reasons, yet the great industrial advance of Germany happens to coincide with its adoption of a theory of distributing the losses of work accidents without regard to whether they are caused by fault or not.

The Four Classes of Remedies

The remedies proposed fall into four classes.

1. The enactment of a compensation act, so-called, whereby an employer in addition to the existing remedies at common law, or under the statutes where recovery is based on fault, is also required to pay specified relief when an accident occurs regardless of fault. This was the statute enacted in New York, applied, however, only to certain hazardous businesses, and is in substance the English theory. This statute has lately been held unconstitutional by the New York Court of Appeals.

2. The enactment of a compensation act whereby existing common law and statutory remedies are repealed and the employer is required to pay specified relief when even an accident occurs regardless of fault and is subject to no other liability. This theory, which has nowhere as yet been adopted, is proposed either as to all employers and employees, or as to distinctly hazardous occupations only, or as to occupations where more than five or six persons are regularly employed.

*Author of "Employer's Liability Acts and the Assumption of Risks."

3. The enactment of a compensation act which repeals certain existing common law and statutory defenses of the master, such as the fellow servant defense, modifies in the employee's favor the contributory negligence and assumption of risk defenses, and provides that thereafter every employment shall be construed to be made under, and with reference to, a compensation plan establishing specified relief whenever an accident occurs regardless of fault. The statute also provides that the employer shall not be otherwise liable unless he elects in a specified manner not to come within the compensation statute, or unless the employee at the time of hiring shall elect not to come under it. The expectation being that if an employer does not elect to come under the plan he will have practically no chance successfully to defend against a suit for unlimited damages, and consequently will wish to accept the statute, while an employee will be likely to desire to come under it and if he does not he may not be employed. Such a statute has lately been passed in New Jersey.

4. The last theory is the establishment of an insurance fund managed by the state to which employers in certain hazardous industries are required to pay premiums proportional to the risk of their business, and from which specified relief is to be paid to injured workmen; and an employer who has paid the requisite sums into this fund is subject to no other liability. The adjustment of disputes is committed to state officials. The most thoroughgoing statute along this line is the one lately passed by the State of Washington. It follows in substance the Continental insurance plan.

Avoiding Constitutional Difficulties

These four general theories are exemplified in infinite variety in many bills now pending in the several legislatures. The second and third theories are directed to the same end, but the second does directly what the third, the New Jersey statute, does indirectly. This indirection has been adopted to avoid certain real or assumed constitutional difficulties and seems to accomplish that purpose. However, this very indirection leaves a loop-hole whereby, in some circumstances, the statute may fail in practice.

The state insurance plan, of which the Washington statute is a type, commits the state to a leap in the dark so far as expense is concerned, and to that degree, until more careful data are obtained, seems a hazardous financial experiment. It has the further defect of being open not only to all the constitutional objections that are urged against the other theories, but to the grave doubt whether the state may legally embark, even to a limited extent, in the insurance business.

If the new system of law is so framed as still to permit both a liability founded as now on fault with recovery by trial of unlimited damages, and also to require certain and definite payments for injuries regardless of fault, which is the English theory and the theory of the recent New York statute, almost all the evils of the present system will be perpetuated.

It is true that the injured person under such a scheme is certain of some relief, and to that extent it seems beneficial, but the gambling instinct is strong and the ambulance chaser dies hard, and the employee would be apt to take advice whether his best chance was to sue at common law for unlimited damages, or under the employer's liability act with a greater chance of recovery for limited damages, or under the compensation act for the small but certain relief; and in any case take the risk of his decision and the expense incurred by it. Employers can never tell when an accident happens what course will be pursued. They must continue, therefore, to take all the precautions and incur all the expense which they do at present, and that means that most employers must still insure against these uncertainties and pay largely increased premiums to cover these several contingencies. There is little likelihood that such a system will tend to prevent accidents.

The English experience seems to show that the waste and evils of the present system have not been eliminated, and the New York statute in the short time it was effective had a similar result.

Abandoning the Theory of Fault

If, on the other hand, the theory of fault as the only basis, or one of the bases, for recovery can be abandoned and the principle recognized that modern industry, however safely it may be carried on, inevitably causes personal injuries, the losses of which neither employer nor employee, who are bound in their different spheres to meet these

perils, can wholly avoid, and that consequently these losses should be treated as a necessary part of the manufacturing cost, the desirable ends can be very nearly approximated.

So soon as it is found that the occurrence of an injury causes certain definite expense to the employer which he can no longer escape by his time-honored defenses or postpone by the gamble of a trial, he will bring to the reduction of these accident costs the same acumen that has led him to systematize and reduce his costs of manufacture; and the result must be that the plant, which, compared with others of its class, has the lowest accident cost will be apt to show the greater profit, not only because of this saving but because, by the reduction in the number of accidents, the manufacturing processes are less interrupted and skilled workmen are preserved instead of disabled.

With the removal of the uncertainty as to his liability, an employer will shortly be able to forecast how many of his men are likely to be hurt each year, the average seriousness and the cost. A mill employing 3,000 hands can now without much difficulty discover from its accident reports for four or five years the yearly average, and to a large degree the yearly cost of its injuries under the scheduled payments of any of the proposed compensation acts where specified payments are made the exclusive remedy. A mill employing 50 hands cannot from its own records get data which would be of much value, though several mills in the same line of business may do so. But such accident cost cannot be determined by any mill where the compensation scheme is not an exclusive remedy, and the injured person has also a right to proceed under existing remedies grounded on fault for the recovery of such sums as a jury may see fit to give.

The Question of Insurance

With an accident cost capable of reasonable computation an employer is in a position to decide whether he will carry his own risk, or join with others of a similar business in a mutual insurance company, or insure in the present stock companies which under such conditions would be able to carry on their business with much less than the present necessary waste. If at any time a plan of state insurance should be found practical and legal it could easily be grafted on to this system.

The advantage to the employer of making his accident costs as definite and computable as possible seems to be obvious. It is equally advantageous to the employee. It is true that it may happen that a worker is injured \$10,000 worth and under such a plan he can receive but the fixed limit of \$3,000, say, or he may be hurt, and, getting well within the usually provided waiting period of two weeks, receive nothing. But the former case is but a fraction of a per cent. of all injuries, and in the latter case he almost invariably gets nothing now. In return, however, for yielding these slight opportunities he will be certain to obtain definite and immediate relief without cost for every serious injury, no matter how caused. Of course disputes cannot be wholly eliminated. The parties will not always agree as to the seriousness of the injuries or the proportion of the statutory relief to be paid. But disputes on the issue of liability will be practically removed and such differences as there are can be quickly and inexpensively determined.

For these reasons it is believed that the greatest practical benefit to all parties lies in the second of the four theories above stated—that of doing away entirely with all existing remedies and establishing in their place a single compulsory relief plan. The New York statute, a relief plan concurrent with existing remedies, offered very slight, if any, advantage over the present system. It remains to consider whether a single compulsory relief plan is constitutional.

Constitutional Amendment Unnecessary

The decision of the New York Court of Appeals holding the New York statute unconstitutional, and therefore closing the door on that theory, does not necessarily mean that all other theories are also unconstitutional or that those who have at heart some new scheme of things must hasten to tinker the constitution. In spite of the almost universal criticism of this decision, the actual holding of the court, though perhaps not everything said by the judge in the course of the opinion, seems right, and, for the reasons already given, wise from a practical standpoint.

No one doubts that it is entirely competent for the legislature to modify or abolish the "fellow servant rule;" to

modify and in some respects, certainly, to abolish the doctrine of assumption of risk; to shift the burden of proving contributory negligence, or to put in its place, as the federal statute relating to interstate railroads has done, the doctrine of comparative negligence. The Court of Appeals so held; but further the court held that when the legislature attempted to make one carrying on a lawful business pay to a person injured in that business compensation where neither the master nor his representative was guilty of any fault whatever this was a taking of the master's property "without due process of law" just as if it compelled him to pay another's debts. This decision holds that such a statute, however desirable it may be, does not come within the "police power" of the state, which frequently takes a man's property without compensation, because the statute "does nothing to conserve the health, safety or morals of the employees and it imposes upon the employer no new or affirmative duties or responsibilities in the conduct of his business" which are the only grounds upon which the police power may be invoked; and "its sole purpose is to make him liable for injuries which may be sustained wholly without his fault and solely through the fault of the employee." The court further holds that such a statute "does not affect the status of employment at all, but writes into the contract between the employer and employee without the consent of the former a liability on his part which never existed before and to which he is permitted to interpose practically no defense."

It may well be that, viewed in the light of the public policy of the State of New York defining the law governing industrial accidents, this statute was not a proper exercise of the police power, and did not properly affect the status of employer and employee, and was therefore an arbitrary taking of property without due process of law.

Industrial Evolution and the Law

The law under which we live, whether it be the common law or the statutory law yearly enacted by our legislatures, is but the declaration of the policy of the commonwealth as it is viewed from time to time. Chief Justice Shaw, who first clearly defined the principles of the common law relating to industrial accidents, said that "the rule resulted from considerations as well of justice as of policy," and that "it is competent for courts of justice to regard considerations of policy and general convenience, and to draw from them such rules as will, in their practical application, best promote the safety and security of all parties concerned." The common law of the sixteenth century is not the common law of the twentieth. It has been altered constantly by custom, by declaration of judges, as well as by statutes, to meet changing conditions.

As the industrial conditions with reference to which the chief justice was speaking have so radically changed, it may well be that the law should change with them. But the change must not be arbitrary or inconsistent with sound policy. In New York it had been, and after the passage of this statute it continued to be, the policy of the state that an employer should be answerable in damages when he or certain of his representatives, through fault, injured an employee, and that the damages should be compensatory, that is, make good the loss sustained. And then, retaining this theory of liability based on fault and compensatory damages, the state, by its new statute, said that the employer should be liable in any event to pay something to his injured employee regardless of fault, and this payment, because it is specified, does not pretend to be compensation.

Here are two inconsistent policies, for, if fault is retained as a basis of liability, a requirement also to pay where there is no fault is simply compelling a gift, and if an injured person in some cases may receive compensatory damages he should in all. The incidents of the status of employer and employee are therefore arbitrarily and inconsistently affected. Nor can these payments fairly be regarded as a tax or fee or penalty for carrying on a dangerous business, first, because only one of the parties concerned in conducting the business, the employer, is required to pay them; while the employee, who is equally concerned in conducting such a business, and whose acts in it are largely responsible for the losses, is required to yield nothing and is given not only all the rights he had before the passage of the statute but rights new and beneficial to him; and, second, because the injured employee himself is given the power to decide whether he will claim compensatory damages or claim the statutory relief. As the statutory payments must be construed, therefore, as

based upon the compensation rather than the penalty idea, the statute does not directly tend to the preservation of the public health, safety or morals, though that may be its incidental effect, and consequently it does not come within the police power of the state.

Safeguarding Public Rights

But suppose the statute had proceeded upon a different theory. Suppose that it were shown that modern industry inevitably caused personal injuries, the great majority of which were not referable to fault at all, and the loss of which was borne inequitably to the detriment of the community, and that he who chose to engage in modern industry whether as employer or as employee thereby necessarily set in motion the risks which caused this loss. It would not then be an unusual exhibition of the police power of the state to say that such a use of property or personal rights causing such demonstrable losses should be restricted or regulated. Many a lawful occupation is so regulated. The manufacture of liquors, the practice of medicine, the erection of buildings, the peddling of goods, the hours or conditions of employment, are a few of a hundred examples. If the legislature should deem that a wise regulation of such a business were to require that an accident happening in the course of it, however caused, should bear a certain definite penalty; that the employer should pay part of the penalty in money, and the employee should pay part of it in suffering and lost time and yielding any right to claim compensation; that the employer should in no way be able to avoid paying his part and that the employee should in no way be able to get more—then both parties would be penalized for setting in motion these risks and the risks would be apt to be diminished and the losses caused by them more evenly distributed. Here is a tax, or fee, or penalty, whatever it may be called, for so using one's property, whether such property be money or limb or liberty, as to injure others, and the idea of compensation is entirely eliminated. The payments are not indemnity to an individual for a loss suffered, but a penalty payable to the community for allowing an accident to occur; and this character is not changed because the legislature thinks best to require them to be paid to the injured worker rather than to the state. The purpose of such a statute is the protection of public rather than individual rights. There is nothing in the actual decision of the New York Court of Appeals which renders a statute based on such a theory an improper exercise of the police power.

Or there is another path. The present rights and obligations of the relation of employer and employee exist through no express or implied contract between them, but because the parties have seen fit to enter a certain relation or status to which the policy of the law has annexed certain incidents without their knowledge and irrespective of their desires or control.

The Impossible Contract

It is as impossible for an employer to contract with his employee that he will or will not be responsible for the negligence of all his servants, or for the risks of his business, as it is for a man and woman about to marry to contract that their marriage shall continue but a year. The policy of the law determines the incidents of this status, not the express or implied contract of the parties. "Considerations of policy and general convenience" speaking through the common or statute law are constantly regulating the future relations of persons, and prescribing the incidents of such relations into which persons may or may not thereafter choose to enter. A carrier of goods is made an insurer, a carrier of passengers is made subject to the highest degree of care, but both, with reference to their servants, are subject only to ordinary care. One who collects dangerous substances on his premises may be an insurer, or one who runs a locomotive be liable for fire communicated from it without his fault. So the policy of the law may deny recovery for real injuries, as the common law denied civil liability for causing death, or may determine what shall be a legal "loss." Such regulations deal with future conditions and relations, not with existing ones, and are not a taking of property, for there is no property to be taken. It would hardly be contended that when the common law incidents of the marriage relation in the eighteenth century, the right of a husband to chastise his wife, to reduce her property to possession and expend it, and the like, were altered by statute, so that thereafter a husband did not have such rights, his property

was taken without due process of law and the statutes were unconstitutional.

Yet the policy which lays down these rules of future conduct either through the common law or statutory enactment must be reasonable and consistent. A statute which provided that a carrier of passengers must exercise the highest degree of care, but that if the passenger could not prove a failure to exercise such care the carrier must pay him something anyway, would be thought arbitrary and unreasonable, though if it changed the present policy and made the carrier an insurer it would probably not be so considered.

If the conditions of industry in 1840 which dictated the common law governing the status of employer and employee have changed, if in the old days the majority of accidents were caused by fault and if now the majority of accidents are caused without fault and are unavoidable, it is quite possible that sound policy should dictate new rules regarding them, and if that policy should do away with remedies applicable only to the old conditions and in their place establish remedies applicable to the new, it might not be unreasonable.

The Seaman and His Vessel

The New York court in explaining certain peculiar incidents of the status of seamen and vessel, whereby to some extent liability is imposed on the vessel regardless of fault, uses these words, which seem entirely applicable to the conditions of modern industry: "The contracts and services of seamen are exceptional in character. He is in effect a co-adventurer with the master and shares in the risks of shipwreck and capture or from losing his wages by casualties which do not affect workmen on land. For this and many obvious reasons the maritime law has wisely and benevolently built up peculiar rights and privileges for the protection of the seaman which are not cognizable in the common law. When he is sick or injured he is entitled to be cared for at the expense of the ship * * * that is a right given to seamen and a duty enjoined upon the master by the plainest dictates of justice which arises out of the necessities of the case. * * * Courts have always regarded seamen as irresponsible to a degree which makes them incapable to fully protect their own rights." Surely to-day employer and workman are co-adventurers in the inevitable and undeniable risks of modern industry, and the chance of harm is greater and as sure from the mechanical forces which employer and workman have conjured up as a means of earning their joint livelihood, as from the perils of wind and wave. Against such risks the workman can no longer guard, and injury means disaster to him.

The court saw no analogy here; nor, in the public policy of the state retaining as described above its inconsistent theories of liability, is there any analogy. But another court, or perhaps the New York court itself, might well say when a definite and consistent policy is presented whereby the theory of compensation and liability based on fault are removed and the parties, free to enter an industry, as co-adventurers in the industrial perils, divide the losses fairly between them, that such a law is not a taking of property and is within the power of the state to enact.

Troublesome Matters to Overcome

Of course these are merely general principles, and there are many troublesome matters of scope, machinery and special constitutional provisions, as for example the right of trial by jury, that must be considered. The point to be made is that the decision of the New York Court of Appeals is not necessarily discouraging to those who desire a change, that the door which has been closed is one which would have perpetuated most of the present evils and have been of no general advantage, and that other and better ways are still open.

It is strange that, in a matter so nearly affecting business prosperity, the several commissions should have received so little help from employers. That this legislation is indorsed by "labor" does not necessarily mean that it is bad, or if indorsed by social workers and economists that it is impractical. A theory that in one form or another has been adopted by almost every civilized nation except the United States cannot well be out of accord with principles of natural justice or a blight on the prosperity of the country. The business man who approaches this question with a broad outlook can tell better than any theorist what scheme is just and practical and to the working out of any plan his help is essential.

Titanium in Iron and Steel

Further Results of the Use of the Alloy Brought Out Before the American Foundrymen's Association

Papers presented by Charles V. Slocum, Pittsburgh, at last week's convention of the American Foundrymen's Association, one on "Titanium in Iron," the other on "Titanium in Steel," brought out some interesting details of the use of the alloy, including those evolved in the experience of several manufacturers and investigators. Mr. Slocum said, in part:

Titanium in Iron

In a letter dated April 5, 1911, the writer was advised by Asa W. Whitney, metallurgist of the Enterprise Foundry & Machine Company, Bristol, Va., that he had made a number of careful trials of titanium in hard or chilling iron. He finds that 0.1 to 0.2 per cent. of the alloy is usually all that is necessary to make otherwise viscous, high chilling mixtures come from the cupola close grained and pour from the ladle as freely as iron carrying half as much chill and of more open grade. The iron pours well to the last and gives clean solid castings. "I find," Mr. Whitney says, "that I am able to compensate for the cost of the titanium with less manganese and a trifle less silicon."

To foundrymen the fact that the metal remains hot longer than untreated iron is a matter of much importance for certain classes of work, since the greater fluidity means that the iron will settle more slowly in the mold, and thus give time for the gases to escape and more time for the iron to fill every smallest outline of the mold without pulling away from the main body of the casting. These features of good foundry practice are some of the ones which are often overlooked, and a high percentage of bad work results.

BENEFITS FROM USING LARGER PERCENTAGES.

Now in relation to the benefits to be expected from using larger proportions of alloy, I maintain that a great deal of undue importance is often attributed to an increase in transverse and tensile strength. This may be necessary for certain government work and for some few castings which must resist unusual stresses in service, and for such it is necessary to use at least one per cent. of titanium alloy.

My contention is, however, that such a percentage is not only a serious increase in cost per ton of product for ordinary castings, but in all the practical uses to which most castings are subjected no special increase of strength is required, although an improvement in quality may be absolutely necessary. We have in mind a recent case where the castings in a certain foundry were stronger than necessary, were well made and were satisfactory to the foundry superintendent and to his customers, but when he tried the small quantity of alloy usually recommended for such cases merely for the purpose of improving the fluidity of the molten metal and the density, machining quality and durability of the casting, he found that the machine shop of one of the great railroad companies which turned up the castings reported that these treated specimens (piston rings) were closer grained, were more like steel and were more desirable for their purpose. Yet of the four test bars cast one of untreated iron was strongest in transverse strength.

On the other hand, a large manufacturer of my acquaintance having a 10-ton casting to make, and being anxious to have no failure in so important a job, added one per cent. of titanium alloy and secured a splendid casting which may have cost him \$25 extra for all the alloy used, but which made a sure thing of a single part of the machine worth at least \$400, even without including the machining.

THE POOREST MIX OF SCRAP GREATLY IMPROVED.

In a recent trial of titanium alloy in the cupola with a mixture of burnt iron, stove plate, etc., in a large foundry in the Pittsburgh district, the rather large percentage (for iron) of one-half of one per cent. of alloy was used, together with one-half of 1 per cent. of ferromanganese of the usual 80 per cent. grade. This trial demonstrated the interesting fact that the poorest mix which can be imagined, perhaps, may be brought to good normal No. 1

iron by this method. The average of all the test bars, of which there were 10, was 3,100 lb. breaking strain and an average deflection of 0.146 in.

One of the best known foundries in Columbus, Ohio, uses, for certain purposes, a cheap mixture which analyzes about as follows:

Silicon	1.60
Sulphur	0.11
Phosphorus	0.55
Manganese	0.50

One-fourth of one per cent. of titanium alloy was added in the cupola and the foundry foreman reported immediate benefit in the fluidity of the metal and in the distinct improvement to the castings. This rejuvenation of the iron, so to speak, involved an extra cost of 62½ cents per net ton of metal treated, and was more than repaid in the reduction in bad work without regard to the benefit to the iron. Castings from this iron, with fine grain and good metal, were made which were only 5/16 in. by ¼ in. section.

Titanium in Steel Castings

In the mills of one of the most scientific steel makers in the United States, steel castings are required of the following specifications:

Elastic limit.....	45,000 lb. per sq. in.
Tensile strength.....	85,000 lb. per sq. in.
Elongation after rupture.....	12 per cent.
Contraction of area.....	18 per cent.

"These specifications have been met and the necessity for numerous heat treatments have been avoided by the use of eight pounds of titanium alloy per ton of metal (=0.4 of alloy or 0.04 Ti) added in the ladle. No aluminum was used."

These parties write as follows:

"Comparing the results of the tests made upon specimens after the first anneal, of the last 15 heats in which ferrotitanium was used, with those of the last 15 previous heats in which it was not used, it appears that the mean tensile strength was increased from 81,633 lb. per sq. in. to 91,533 lb. per sq. in.; that the mean elastic limit was increased from 47,233 lb. per sq. in. to 50,000 lb. per sq. in.; that the mean elongation was increased from 15.1 per cent. to 19.2 per cent., and that the mean contraction of area was increased from 18.9 per cent. to 24.3 per cent."

In a letter dated April 12, 1911, J. H. F. Dixon, general manager of the Keystone Steel Casting Company, Chester, Pa., makes the following comment on the use of titanium alloy in the company's steel castings:

"The added cost of the production of our metal by the use of this alloy is so slight that we are prepared to furnish genuine crucible castings, titanium treated, at the same schedule of prices which apply to our carbon steel. We strongly recommend the use of steel so treated for automobile work, where the castings are subject to unusual shocks and where uniformity of the material is absolutely essential."

BENEFICIAL EFFECTS IN WELDING.

In a letter dated April 8, 1911, Prof. Enrique Touceda of the Rensselaer Polytechnic Institute writes as follows:

"The beneficent results of the (titanium) addition can best be illustrated as follows: It is difficult to make a good weld with plain steel because, on heating the two parts to be welded, the surface of the metal oxidizes and this oxide prevents the two metallic parts from coming in close contact when being hammered for welding.

"In the case of steel, if sand or borax or some similarly acid material be sprinkled on the parts to be welded, the silica of the sand will unite with the iron oxide, forming silicate of iron. This silicate of iron, unlike the iron oxide, melts at a low temperature, is not viscous, and when the two pieces of steel are struck for welding, the fluid slag of the iron silicate is forced out and the two clean surfaces are brought intimately together and a good weld results.

"Let us now consider the two surfaces referred to as if they were the sides of two large crystals, in order to draw the analogy.

"All steel is composed of an aggregation of crystalline masses, each crystal having a definite boundary, and each crystal being welded, so to speak, with or into its adjacent ones. It is a well-known fact that the impurities in all metals and alloys tend to segregate at the boundaries, which fact well explains the damage done by certain additions, such as bismuth to copper, etc. The beneficent action of titanium is due to the fact that it makes more intimate the contact between the crystals in the steel, thereby making the cohesion more perfect. It is known that the occluded gases segregate to the boundary of the crystals also, and the uniting of the titanium with the occluded nitrogen makes more perfect the union of the crystals to each other.

"It is manifest, therefore, that the improvement will not be fully shown in the usual tension tests, as these tests have to do with stresses that are equally applied in the same direction, and such tests do not tend to act on the crystals eccentrically. On the other hand, in the Landgraf-Turner machine, the tendency is for the boundary of the crystal to open up, first on one side, and then on the other, and at one instant the very edge of the united crystals are receiving the entire load so long as distortion continues, while the reverse action takes place when the test bar is hit on the other side. It is in this kind of testing that the worth of the bond between the crystals is shown, and this explains why these tests show better with the titanium treated than with the untreated specimens."

Titanium for Malleable Iron

A paper on titanium for malleable iron read by C. H. Gale, of the Pressed Steel Car Company, Pittsburgh, was substantially in full as follows:

In order to learn what good might result from ferrotitanium if added to malleable iron, the writer made a series of tests which he begs to contribute as part of the investigations of the American Foundrymen's Association. The first series of tests were made with ferrotitanium additions to the ladle. The alloy was supposed to contain about 10 per cent. titanium; in reality, however, it ran higher, or about 17 per cent. As this condition resulted in an increased difficulty in melting the alloy, particularly where the larger quantities were used, considerably less of the alloy was actually taken up than the calculated quantities would indicate. It must further be remembered that in comparing tests with titanium in molten gray iron and malleable that the latter, while appearing intensely hot, may in reality be of a lower temperature than an ordinary foundry melt.

In the tests three hand ladles containing about 40 lb. of iron each were taken from the very early part of a 15-ton heat made in the open hearth furnace, the heat being the second one of that day. The first ladle was held without any titanium alloy addition. To the second ladle there was added sufficient alloy to introduce 0.125 titanium into the iron. To the third ladle double this amount was added. After stirring the second and third ladles to get as much as possible of the alloy in solution, the contents of the three ladles was poured into three molds. It will be noted that the third ladle was the coldest of the three. In consequence of this it was not surprising that the heavy sprue in this case was nearly gray in fracture, the second mottled and the first dead white. The analysis of the metal was as follows: Sil., 0.66; sul., 0.046; phos., 0.175; mang., 0.36; C. C., 2.66; graphite, trace. None of the bars to which titanium had been added showed the slightest trace of this element on analysis. While the sprues indicated the precipitation of graphite as the titanium additions arose, the bars themselves should not have done so for the analysis given.

A second set of ladles treated in exactly the same manner was taken from near the end of the heat and gave the same indications.

Each mold contained two test bars, one round bar for tensile tests, varying from 0.614 to 0.637 in. in diameter for the lot cast, this dimension being at the middle of the bar where the diameter was the smallest. With this bar was cast another one for transverse tests ½ x 1 in. in section and 14 in. long. All bars were carefully marked so that they could be readily traced in the tests. The tensile tests were made on a 100,000-lb. testing machine at the foundry where these tests were carried out. The transverse tests were made by Dr. R. Moldenke on the

5000-lb. transverse machine at Castle Elsinore, N. J. The following are the results:

Average of Tensile Tests of Malleable Iron with Titanium Treatment

Ultimate Strength Lb. per Sq. In.	First Part of Heat		Titanium Added.
	Elongation in 2 in. Per Cent.		
49,717	6		None
46,481	3.4		0.125
42,800	2.9		0.250
	Last Part of Heat		
	Elongation in 2 in. Per Cent.		
48,368	6.2		None
43,452	2.3		0.125
45,294	3.1		0.250

The considerable cooling of the metal by the alloy addition in the ladle practically spoiled the test bars with high titanium additions, the metal not being able to clear itself from slag and dirt. Yet it was noticed that even with a bar flawed to one quarter of its cross section, an astonishingly high ultimate stretch was attained. Similarly the presence of dirt and flaws affected the elongation, actually cutting this off abruptly. Hence the figures are quite low.

Considering the above, definite conclusion cannot be drawn from the tensile test results so far as the action of titanium on malleable is concerned. Further, a glance at the figures obtained for the regular metal without titanium additions show the improbability of serious oxidation influences that could have been corrected by the titanium additions. Trying this with cupola metal would have been another story.

The transverse tests gave the following results:

Average Results of Transverse Tests

Broke, Lb. per Sq. In.	First Part of Heat		Titanium Added.
	Deflection in Inches.		
*1,380	1.80 plus		0.125
1,270	1.62		"
*1,370	1.80 plus		"
Average 1,315	Average 1.74		
1,142	0.83		None
1,162	0.72		0.250
	Last Part of Heat		
	Deflection in Inches.		
1,213	1.24		None
1,260	1.40		0.125
*1,320	1.80 plus		"
1,290	1.68		"
Average 1,290	Average 1.62		
1,030	0.58		0.250
*1,310	1.80 plus		"
1,340	1.32		"
Average 1,227	Average 1.23		

*Beyond the range of the machine, so far as deflection was concerned. The test pieces in these cases were not broken, and might have shown some increase in the figures given for the breaking strength had the bending been carried further on.

The next series of tests was to observe the effects of titanium in "malleable" when added to the bath of molten metal. The alloy was added after the charge had melted down and the slag had been skimmed; that is, about 30 to 45 min. before tapping the 10-ton afternoon heat of an open hearth furnace. The bars cast gave the results herewith recorded.

Tensile Tests of Malleable Iron

Date.	Elongation		Titanium Added.	Remarks.
	Ultimate Strength, Lb. per Sq. In.	in 2 In. Per Cent.		
Feb. 7	58,558	6.2	None	First of Heat
"	55,534	7.1	"	" " "
"	55,884	4.7	"	Last of Heat
"	43,666	3.9	"	" " "
Feb. 8	54,761	6.2	None	First of Heat
"	44,841	3.1	"	" " "
"	53,835	6.2	"	Last of Heat
"	54,135	4.7	"	" " "
Feb. 9	58,160	9.3	0.03	First of Heat
"	54,233	6.2	"	" " "
"	57,755	10.9	"	Last of Heat
"	48,272	3.1	"	" " "
Feb. 10	52,333	4.7	0.03	First of Heat
"	57,518	7.8	"	" " "
"	58,479	4.7	"	Last of Heat
"	55,802	2.3	"	" " "
Feb. 12	56,717	6.2	0.03	First of Heat
"	59,141	4.7	"	" " "
"	56,468	3.9	"	Last of Heat
"	59,801	7.8	"	" " "
Feb. 14	50,855	10.9	0.03	First of Heat
"	52,574	9.3	"	" " "
"	53,509	3.9	"	Last of Heat
"	56,996	7.8	"	" " "
Feb. 15	48,770	6.2	0.06	First of Heat
"	53,866	2.3	"	" " "
"	49,679	4.7	"	Last of Heat
"	49,377	3.9	"	" " "
Feb. 16	*42,456	1.5	0.06	First of Heat
"	50,133	4.7	"	" " "
"	59,933	4.7	"	Last of Heat
"	59,797	6.2	"	" " "
Feb. 17	63,443	7.8	0.06	First of Heat
"	50,352	3.1	"	" " "
"	57,397	9.3	"	Last of Heat
"	*45,379	1.5	"	" " "

*Flawed.

Transverse Tests of Malleable Iron

Date.	Broke, Deflection		Titanium Added.	Remarks.
	Lb. per Sq. In.	in In.		
Feb. 7	1,175	1.62	None	First of Heat
"	1,150	1.58	"	" " "
"	1,050	1.51	"	Last of Heat
"	1,050	1.42	"	" " "
Feb. 8	1,020	1.58	None	First of Heat
"	1,050	0.89	"	" " "
"	1,005	1.32	"	Last of Heat
"	925	1.03	"	" " "
Feb. 9	1,070	1.10	None	First of Heat
"	1,275	1.32	"	" " "
"	1,030	1.30	"	Last of Heat
"	1,030	1.30	"	" " "
Feb. 10	1,100	1.61	0.03	First of Heat
"	1,070	1.07	"	" " "
"	1,170	1.32	"	Last of Heat
"	1,130	1.53	"	" " "
Feb. 12	1,110	1.15	0.03	First of Heat
"	1,330	1.75	"	" " "
"	*1,275	1.80	"	Last of Heat
"	1,030	1.30	"	Last of Heat
Feb. 14	1,110	1.30	0.03	First of Heat
"	1,120	1.32	"	" " "
"	1,130	0.82	"	Last of Heat
"	1,290	1.57	"	" " "
Feb. 15	1,180	1.70	0.06	First of Heat
"	1,160	1.80	"	" " "
"	1,220	1.20	"	Last of Heat
"	1,105	1.59	"	" " "
Feb. 16	1,240	1.60	0.06	First of Heat
"	*1,200	1.80	"	" " "
"	1,190	1.17	"	Last of Heat
"	1,170	1.35	"	" " "
Feb. 17	*1,180	1.80	0.06	First of Heat
"	1,130	1.15	"	" " "
"	1,090	1.32	"	Last of Heat
"	*1,240	1.80	"	" " "

*Beyond range of machine for deflection. Test bars not broken and might have shown increase in breaking strength had it been possible to carry on the test further.

The percentage of titanium added to the second series of tests was much less than in the first. Here also no titanium remained in the metal of the heat.

Both series plainly show improvement in the metal as indicated by the transverse test. Unquestionably the undue cooling of the metal by the alloy additions in the ladle militated against soundness on the part of the bars, particularly for the tensile test—the bars being round—and hence the results obtained should not be taken too seriously. In the case of the transverse bars, however, they are somewhat different, for in the actual test the strain is principally on the outer fiber of a flat bar and this portion of the bar is usually pretty sound. The excellent bending results obtained in spite of the interior shrinkage due to cold metal in the first series of bars gave a more reliable clue to what is going on.

The one interesting point lies in the action on the heavier section where graphite was thrown out. Undoubtedly the cooling action had much to do with this.

Titanium, however, as well as aluminum, when used in comparatively large quantities for purifying effects, has the effect of allowing graphite to separate out easier and doubtless (for the titanium as well as aluminum disappears completely in the dioxidation). Here again we see the difference between charcoal and coke for malleable practice. The silicon in charcoal iron charges for malleable ought to be lower than for coke irons, otherwise for the same section the metal would come out "lower." It would seem that the use of titanium in malleable would be particularly advantageous for the heavier classes of work in allowing the silicon to run much lower and in doing this safely give good, soft, strong castings.

The Jamieson Coal & Coke Company.—This company, whose office is in the Oliver Building, Pittsburgh, has recently made returns to the Department of Internal Affairs, Pennsylvania, showing its summary of pay-rolls for the year 1910 to have been as follows:

	Number Employed.	Number of Days.	Total Wages.	Average for Year.	Average Per Day.
Miners	989	306	\$773,004.96	\$781.60	\$2.55
Mine laborers...	664	306	439,695.05	662.19	2.16
Coke laborers...	516	284	287,242.09	556.67	1.96
Total	2,169	...	\$1,499,943.10	\$691.54	\$2.30

The average number of men at work daily ranged from 2524, the maximum, in February, to 1872, the minimum, in July. The actual cash paid on pay-rolls ranged from \$51,590.38, March 1 to 15, to \$38,567.34, July 1 to 15. The company is now operating about 70 per cent. of its coke ovens and about 80 to 85 per cent. of its coal mining capacity.

The Hope Engineering & Supply Company has opened offices in the Farmers' Bank Building, Pittsburgh, as consulting and contracting engineer in natural gas. Alfred J. Diescher is engineer for the new company.

Distributing Expense Burden*

The Analysis Based Upon the Capacity to Produce, Not Upon the Cost of Production

BY A. HAMILTON CHURCH,†

The salient feature in machine shop activity, the end toward which it is created and maintained, is the getting of work past the tool point. However numerous and complex the subsidiary activities, they all of them serve or should serve to this end and no other. From this definition as a starting point we may develop our first general proposition, namely, that every legitimate expense in a machine shop is incurred for the purpose of getting the work up to, under, or away from the tool point, in one way or another.

One class of this expenditure is easily understood and mastered. The cost of the machine operator's labor—and his labor is at the tool point—is in most cases a perfectly straightforward problem, and is handled most successfully by existing cost methods. All the remainder, however, amounting to anything from 100 to 200 per cent of direct operative labor, is usually jumbled together into a common fund termed expense burden.

Now, while we persist in regarding this great mass of expense simply in the light of a lot of figures to be tabulated, analysed, twisted and tortured in various ways, we may succeed in finding out a number of curious facts worthy of being put on exhibition in a museum, but we shall never get anywhere near knowing the very thing we ought to know—what is the operation cost per hour of each of our machines? We may figure our consumption of coal in terms of pounds weight of product, or ascertain the amount of lubricating oil used and its relation to each \$100 of wages paid to a few decimal points, and I have known things done in an elaborately useless way almost as absurd as this, or we may do what is quite common practice and figure our expense burden as so much per cent of our directly productive wages.

Manufacturing Analysis

The first, and in many ways the most important, discovery that results from an analysis of manufacturing activities is that every manufacturer does a good many things besides manufacture. Some of these he does from necessity, others he does from choice, or because he sees a distinct economic advantage in doing them for himself. Stated in more abstract language, actual production is the last organization in a chain of state but separate organizations.

In order to manufacture economically, most manufacturers (and we may say all large manufacturers without exception) take on a number of non-manufacturing functions, some of which are preliminary to production, such as that of landowner, landlord, or power supplier, and some of which are concurrent with but subsidiary to production, as, for example, storekeeping, and costkeeping. The first three of these are entirely separable and as a matter of practice are not always exercised by the manufacturer; the last two are, of necessity, always exercised by him without recourse to outside aid.

Now, every one who has given any consideration to the question of expense burden is aware that one of its most prominent characteristics is that it does not rise and fall proportionally with the volume of work in the shops. You pay for labor as and when you require it, but you have to foot the bills for expense burden whether you require it or not. If, therefore, you treat burden as an item of cost, you introduce a fluctuating element which very soon ceases to have any valuable significance when work is not steady in the shops. This is largely because the analysis of facts, the division of the functions of the organized factory into manufacturing and non-manufacturing functions, has been overlooked, and consequently the true meaning of expense burden has been missed. I will try to express what I believe to be its true meaning in a single phrase:

What Expense Burden Represents

Expense burden represents, not the cost of production, but the cost of capacity to produce. It follows that, when this capacity is not fully utilized, the cost of the resulting

inefficiency or waste of resources must be kept separate from production costs proper. Under any averaging or percentage system of handling expense burden, this essential and fundamental separation cannot possibly be made.

I will now carry the definition one stage further by saying that expense burden represents, in the main, the aggregate cost of the non-manufacturing functions exercised by the manufacturer, and that the true solution of the problem lies in our ceasing to think of expense burden as a whole, but in turning our attention to the various non-manufacturing services and observing their relation to capacity to produce and then to actual production.

The essence of this principle consists in carefully disentangling all the different items of non-manufacturing services and in observing how each of them, taken separately, bears on capacity to produce, first by departments and then by individual machines. About the simplest case is that of a rented building, the rent of which is obviously easily reducible to an annual rent per square foot of available shop space, and this is charged up to the machine according to the space the latter occupies. Now where the land and the buildings are owned by the manufacturer all the expense and outgoings on the property are kept by themselves and commuted into a rent exactly as if the property was rented from an outsider. They are not thrown into a general collection of similar charges and called expense burden. The exact bearing of that particular non-manufacturing function called property-owning on capacity to produce, is ascertained just as it would be ascertained if the property were rented from an outsider, all the group of expenses belonging to it are segregated and merged in an annual rent. Further, it has been found to be quite as easy to segregate all the other indirect or non-manufacturing services and reduce them to rents chargeable for such services, instead of throwing them into a general expense burden fund.

Charging Up Indirect Services

When all such indirect services have been segregated and reduced to rents these are charged first against departments and then against individual machines on various bases of location. The total charge standing against each machine is then divided by the number of working hours in a month or year, and so an hourly rent for the use of that machine is determined.

When all such rents for indirect services have been determined and given an outlet on to jobs in the form of machine rents a further and most important principle of my method comes into play. The capacity to produce may not always be utilized to the full. In the case of a given machine having a rent of 25 cents per hour, whatever work is done at it is charged at 25 cents an hour, whether the shop be full or slack. That is to say, that on this method, alone among expense burden methods, production cost is unaffected by conditions in the shop. You must not punish the job because part of your capacity to produce is being wasted. You have only used 25 cents' worth of the capacity to produce which that particular machine possesses, and that is all the job should be charged with.

What, then, becomes of the idle time? This idle time represents wasted capacity to produce, first, of the machines individually; second, of the machines collectively in departments; and, third, of the plant as a whole. In practice the total of idle time by departments is the significant figure. The total of this idle time is ascertained and expressed as a supplementary rate or percentage on the monthly total of machine rents already charged to jobs. You may think that here we get back to a percentage after all. So we do. But consider what this percentage is. It is the ratio of wasted to utilized resources; something quite new and very important to know.

This supplementary rate may or may not be charged to individual jobs, as preferred. Personally, I do not think that there is any great use in doing so as long as the ratio is determined and made known month by month. For it represents waste, and nothing else, and has no real connection with particular jobs at all. If you do charge it up, then you have costs of direct labor, cost of indirect services as expressed in machine rents, and a third figure which gives you a more or less arbitrary allotment of the total waste. But I prefer to consider such waste as

*Condensed from a paper presented before the National Machine Tool Builders' Association, Atlantic City, N. J., May 18, 1911.

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a separate job, and a very bad job, and keep it as a separate item in the shop accounts. For the sake of "rounding off" the costs it is sometimes distributed, but I regard this as a concession to the old idea of getting rid of figures by distributing them somewhere and somehow, regardless of whether the result has any true significance or not. In my idea, waste is waste, and when you have separated it out face it squarely and admit that it is none the less waste if you arbitrarily spread it over jobs. I allow that this is sometimes an uncomfortable thing to have to do.

The Summing Up

To sum up, I will briefly enumerate the principal elements of this method of ascertaining true costs of production separated from wasted capacity to produce.

1. Instead of throwing all indirect expenses together into a common fund of burden, and then elaborately analyzing them in the despairing effort to make something significant out of them, we segregate and keep separate the cost of all non-manufacturing services.

2. Having segregated each group of expenses, we determine the rent charge that must be made for it, precisely as the owner of a terrace of houses settles what rent he will charge individual tenants. But, of course, in the case of these service rents there is no item of net profit included.

3. Each department is charged up with its due share of each of these service rents.

4. The share of individual machines in each of these different service rents is ascertained.

Finally, at the end of this process each machine will have been found to be charged with a number of annual rent charges, which represent the annual cost of that machine's capacity to produce. These separate items are then aggregated and commuted into an hourly machine rent which is charged against all work done at that machine.

This completes the cycle of true costs. The residue which is left over, because idle machines have not charged the whole of their "capacity to produce" on to jobs, is collected together monthly, and represents waste pure and simple, or, as the fashionable term of the day expresses it, it represents "inefficiency." Whether you spread it over jobs or not is not a question of principle, but a matter to be determined by bookkeeping considerations which have nothing to do with costs proper.

Shipments from the Hill Mine

A Large Output for 1911—Concentration at Coleraine

MARQUETTE, Mich., May 20.—The United States Steel Corporation's big concentrating plant at Coleraine, western Mesaba iron range, will be operated practically to its capacity the present season. This washery is designed to separate ore from its sandy or shaly impurities, and with five units installed and in commission it is capable of handling 10,000 tons of material a day of 20 hours. Provision has been made for seven additional units, but except that the steel framework for these is in place their construction has been deferred to a later date. The plant will treat in the neighborhood of 2,000,000 tons of sandy ores this season. Considerable of this product will come from the Hill mine at Marble. The Hill contains probably more than 60,000,000 tons of ore and it is being developed on an extensive scale. It is open-pit property. It entered the shipping list only last season, and yet before navigation had ended in the fall it had forwarded 800,000 tons of ore. That outgo will be better than doubled this season. Indeed, it is expected the shipments will approximate 2,000,000 tons. Stripping the overburden is a work carried on day and night, and it will be continued throughout the year, along with the mining operations. At the present time eight steam shovels and 15 locomotives are in commission. The bulk of the ore is of a grade that can be forwarded directly to the shipping port. The rest must first be sent to the big washery at Coleraine for treatment. To care for this ore the Steel Corporation's Duluth, Missabe & Northern railroad has been laying additional

tracks into the mine. The Great Northern has had a large force of men engaged in similar work.

At Other Minnesota Properties

A new shipper on the Mesaba this year will be the Leonidas mine, a property which the Steel Corporation is opening in the Eveleth district. Stripping was conducted throughout the winter and latterly it has been prosecuted even more vigorously, additional engines and crews having been put to work. A portion of the Leonidas deposit extends to a considerably greater depth than ordinarily is the case on the Mesaba, and for the purpose of mining this ore a shaft is being sunk. This will be carried down 625 ft. and it already has penetrated two-thirds of that distance. Another new mine in this field is the Virginia property of Pickands, Mather & Co. The Virginia began shipments last year and closed the season with a record of 300,000 tons. The output this year will considerably exceed that tonnage.

The Buhl district contains a number of prospective mines. One of these, the Sharon, a mile to the east, is to be opened as a steam shovel producer and it is the understanding the work will be commenced within a short time. A valuable tract in possession of the Steel Corporation is the Culver property. The Culver will be an open pit, but the date of its development is indefinite. An 80-acre tract lying between the Whiteside and Woodbridge mines is controlled by H. L. Bartlett and others of Virginia, Minn. Its value has been proved by exploration and development work is now in progress. Within the limits of the town and near the Great Northern depot, the Iron Mountain Mining Company is conducting exploratory operations. Ore has been encountered and there are excellent grounds for the belief that the deposit is of liberal proportions. Further west on the range, at Nashwauk, the Steel Corporation is the holder of eighty acres adjoining the Cleveland Cliffs Iron Company's Crosby mine. Engineers have been at work there the past fortnight or more engaged in making surveys, and it is reported the development of the property is to be undertaken this season.

The Cuyuna range, the first ore from which is about to be sent out, will have only one shipping mine this season. This will be the Kennedy property of the Rogers-Brown interests. However, a number of properties are in course of development and will commence shipments a year hence. Others are being explored. Most of the activity is in the vicinity of Crosby. This village is growing steadily, as are other communities within the iron-bearing zone, and there is great confidence that the region has a bright future before it. The ore traffic will be handled by the Soo Line, and with its new dock at the head of Lake Superior the railroad is ready for it. The pier is 600 ft. long and 78 ft. high. It contains 100 storage pockets, 50 on each side. The dock is comparatively small, but eventually, as the traffic increases, it will be made materially larger. The railroad company has 1,800 ft. of space from the end of the pier to the harbor line and thus has room to triple the capacity of the dock at any time greater shipping facilities are needed.

The Section Thirty mine, the first property developed on the Vermilion range since the Savoy and the Sibley were opened in 1888, will send out approximately a quarter of a million tons this season, it is expected. It joined the ranks of the shippers last year, with an output of 50,000 tons.

On the Old Ranges

The Iron River field at the western end of the Menominee range has been entered by still another concern of prominence in the iron trade. This is the Wickwire Steel Company of Buffalo. With it added to the list no less than 16 operators of similar kind are now interested in the Iron River country. The Wickwire Company has taken an option on an 80-acre tract in Section 14, 43-35, known as the Purcell property, and has already given a contract to the Cole & McDonald Development Company to explore the land with diamond drills. The Purcell lies in the same locality as the Mineral Mining Company's James mine and the New York State Steel Company's Goodman and Gleason tracts, all of which have been proved to be valuable. There is little question that the land contains ore. The Wickwire Company is understood to be contemplating the exploration of still other properties in the Iron River district. Deals are pending, also, involving the entry of the field by other new interests.

A Special Centrifugal Blower

The use of the air blast for blowing scale from dies is becoming more general. A pressure of from 12 to 14 ounces is ordinarily employed, but where the dies are deep cut as is the case with a large proportion of those used in the manufacture of motor cars, a higher pressure must of necessity be maintained. A recent development of the American Blower Company, Detroit, Mich., is a special centrifugal blower which is designed to produce pres-



Fig. 1.—A New High Efficiency High-Pressure Blower Built by the American Blower Company, Detroit, Mich.

ures as high as 24 ounces per square inch. Although this high pressure renders the blower especially adaptable for service in connection with deep cut dies, it nevertheless can be installed in connection with standard speed electric motors to which it is directly connected. Fig. 1 is a view of one of these blowers and Fig. 2 shows an installation where the blower furnishes the air blast to oil-burning furnaces.

A scale-blowing rig for use with deep dies has recently been installed by the Packard Motor Car Company, Detroit, Mich. The blower forming a part of the outfit is a special high-pressure machine of the type shown in Fig. 1. The wheel is 82 in. in diameter and a pressure



Fig. 2.—The Blower Installed to Supply the Air Blast to Oil Furnaces.

of 22 ounces is regularly maintained in a system comprising 24 deflecting pipes which have an aggregate free area of 34 sq. in. and 54 $\frac{3}{4}$ -in. nozzles for blowing the scale from the dies. The velocity at which the air issues from the latter is 24,000 ft. per minute. A 50-hp. direct current motor operating at a speed of 950 r.p.m. drives the blower through a flexible strap coupling. When all the nozzles and the deflecting pipes are in service the load upon the motor is slightly less than its full rating.

Ordinarily an air compressor might be purchased to supply the blast required in this class of work, but in this particular instance the use of a special type of high efficiency high-pressure blower has not only reduced the initial cost by approximately 50 per cent. but at the same time is effecting savings in both the operating and the maintenance costs. Other uses to which the new blower can be adapted are the furnishing of air blast to oil-fired furnaces as illustrated in Fig. 2 and also for forge and cupola service.

The Growth of Cast Iron

Prof. H. C. H. Carpenter, professor of metallurgy, Victoria University, Manchester, England, presented an interesting paper before the Iron and Steel Institute, at its meeting in London, England, May 10 and 11, on the influence on the growth of cast iron of sulphur, phosphorus and manganese. The paper was supplementary to one published by Professor Carpenter and Professor Rugan on the influence of carbon, silicon and gases dissolved in the iron and those penetrating from outside, which paper was published in the Journal of the Iron and Steel Institute, 1909. A summary of the investigation as to sulphur, phosphorus and manganese follows:

Phosphorus tends to diminish growth. If 0.3 per cent. is present, growth is lessened by about 3 per cent. Higher percentages tend to diminish growth still more.

Sulphur is never present in commercial cast iron in sufficient quantity to have more than a small influence on growth, which is, however, in the direction of retardation.

Manganese retards the rate of growth in all cases, and diminishes the absolute amount in the majority of cases.

Dissolved gases have no influence on the growth of an iron containing more than 3 per cent. of silicon; between 1.75 and 3.0 per cent. of this element, they may cause a growth of from 1 to 2 per cent. Their influence is most potent when silicon does not exceed 1 per cent., and in such cases they may be responsible for a growth of at least 10 per cent.

The simplest and most rapid test for forming an opinion as to the growth that is liable to take place in any particular gray iron is to estimate the silicon, and then read off the approximate growth.

Silicon Per Cent.	Approximate Growth Per Cent.	Silicon Per Cent.	Approximate Growth Per Cent.
1.00	15.0	2.50	31.0
1.25	18.5	2.75	32.5
1.50	21.5	3.00	34.0
1.75	24.5	3.25	35.5
2.00	27.0	3.50	37.0
2.25	29.0		

Alloys containing from 2.25 to 2.40 per cent. of carbon, 0.40 to 0.48 per cent. of silicon, and varying quantities of manganese, showed the following growths after 151 heats:

Manganese Per Cent.	Growth Per Cent.
0.510	7.49
0.735	6.06
0.935	3.09

An alloy containing 2.66 per cent. of carbon, 0.587 per cent. of silicon, and 1.64 per cent. of manganese showed no signs of growth after 150 heats, but, on the contrary, a slight contraction, namely, about 0.13 per cent.

It is a tough material, and its mechanical properties were improved by this treatment.

It begins to freeze at about 1346 deg. C.

It appears to be a suitable material for annealing ovens, rolls, grate bars and the grids of muffle furnaces, whose growth when in the form of gray iron is so objectionable a feature. Probably it could be used for ingot molds in an iron foundry without cracking.

From the point of view of minimum growth and non-cracking, the most suitable material for ingot molds into which molten steel is cast appears to be a very mild steel.

The population of London, England, by the census just completed, is 7,252,963, against 6,581,402 in 1901.

The Pittsburgh Foundry Conventions

Coincident Meetings of the American Foundrymen's, American Brass Founders' and American Foundry Foremen's Associations and Exhibition of the Foundry & Machine Exhibition Company

The exhibition of foundry machinery and supplies was again undeniably the central feature of the foundrymen's meetings at Pittsburgh, Pa., May 23 to 26. This statement is not to be taken as depreciating the value and influence of the formal sessions for the presentation of papers, as the number and quality of the papers were admittedly high, but the technical contributions are recognized as permanent and do not need to have the immediate attention that the instructive and informing details of the exhibits do. It is undoubtedly the fact that the exhibition was the largest given over to the interests of the foundry that the world has ever known. Some 500 tons of machinery, it is estimated, were brought to the exposition halls, and it is believed that the cost of bringing and displaying the material aggregated close to \$200,000. Besides the size of the affair, the use of the buildings of the Western Pennsylvania Exposition Society, including accommodations of the association meetings, added much to the convenience and satisfaction of the convention, and large sales, of interest incidentally to the commercial world at this time, were made by the exhibitors. The associations served to mark again the remarkable progress being made in foundry practice, and the foundrymen's sessions were conspicuous for the attention given to steel casting problems. Finally, the smoothness with which the different meetings and entertainment provisions articulated with one another reflected no inconsiderable advance thought on the part of the association officers and the Pittsburgh Foundrymen's Association.

In last week's issue were reported the opening ceremonies and substantially all the deliberations of Tuesday's meetings, May 23, of the associated foundrymen's annual convention. The joint session held on Tuesday morning had much to do with what may be called

Efficiency in the Foundry

Ellsworth M. Taylor's paper on "Production Costs—A Factor in Scientific Management" accepted a hypothetical condition prevailing in a jobbing foundry, and from that hypothesis proceeded to describe the method of arriving at actual cost of an individual casting. He strongly emphasized the conclusion that the greatest commercial weakness of the foundry industry to-day was the lack of appreciation of sound business methods. "And when I say this, I mean primarily sound cost methods, because sound cost methods are to a manufacturing business what a man's heart is to his body."

The paper by C. E. Knoeppel, New York City, on "The Efficiency Movement in the Foundry," read by title, argued for a closer co-operation between the executive officers and the works to the end that the seemingly illogical condition of higher wages and lower costs might be secured. He discussed in this connection the conservation of human effort.

"Why Cost Systems Fail" by S. E. Nold, Alliance, Ohio, also emphasized the necessity of close co-operation in the office and the plant.

Cupola Charges

"Cupola Melting Practice" by P. Munnoch, taking up the problem from the British standpoint, was read by title. The paper by R. H. Palmer, Salem, Ohio, also on "Cupola Practice," aroused a lot of attention because of an inquiry by Mr. Walker in regard to the variation in ratios mentioned by Mr. Palmer, who spoke of a difference of from 5 to 1 and 10 to 1. Mr. Palmer replied that he ought to have said this variation depended to a considerable extent on the size of the cupola. He also said that the matter of economy was influenced by the demand for iron of the different grades required for the several purposes in his business, as between the small parts and the engine beds and flywheels. He used large charges of coke between the charges of iron in order more definitely to separate these grades of metal. If it were not for this separation by the coke, the two grades of the metal insensibly went into the other. This statement brought out an inquiry as to whether the practice did not raise the height of the charge above the bed, to which Mr. Palmer replied that it did, but he preferred the higher bed.

Major Speer then inquired if the atmospheric conditions

had any effect upon the melting of the iron, to which Mr. Palmer answered that it undoubtedly had; that he preferred a damp day as being the most favorable for the melt. This brought up a question by Mr. Ryan, who wanted to know if the difference in the melting practice under those conditions was not due rather to the effect of the atmosphere upon the belt that drove the blower, giving it a tighter grip. Mr. Palmer replied that his blower was direct connected, and was of the opinion that it did not make any difference one way or the other.

Dr. Moldenke stated that in his judgment and experience it did not matter whether the cupola was large or small; the tuyeres high or low; that the main consideration was to have the iron in 8 to 10 min. and to use small charges. Eight out of 10 foundrymen, he said, did not know how to make iron. He told of a late visit to a foundry melting 50 tons, where he found that the first charge was 8000 lb. and the following charges 2000 lb. He advocated making the charges uniform, 2000 lb., and no further trouble was experienced.

Briquetting Metal Borings

Dr. Moldenke's paper on "The Briquetting of Metal Borings," which was illustrated with lantern slides, proved a most interesting feature of the session. The slides showed interior and exterior views of plants in Germany making briquettes, also the machinery and process of manufacture. In answer to an inquiry as to the cost of making briquettes, Dr. Moldenke replied that it was difficult to give this because the different processes were patented. He added that the cost of producing the briquettes shown in the slides was 60 cents per ton, including overhead charges, interest on investment, etc. The cost of installing one of the plants was estimated at \$35,000. He added that there were ten plants in Europe manufacturing briquetted metal borings and that the briquettes were sold on an equality with pig iron.

He stated that if all briquettes were charged into the cupola, there would be a melting loss of 8 per cent., though with good management this might be reduced to 6 per cent.; but if with only 15 per cent. briquettes, the melting loss would be only 3½ per cent. The silicon, he added, and the total carbon would go down with the use of briquettes while the sulphur went up. In charging steel briquettes in open-hearth furnaces, a saving of 20 to 30 min. was made in getting the heat. He mentioned that the use of briquettes in cylinder work was very satisfactory, securing a close grain in the iron, fine wear, and excellent finish.

The paper by George R. Brandon, of the Whiting Foundry Equipment Company, Harvey, Ill., on the "Me-

chanical Charging of Cupola," described the latest charging machines made by this company. The paper was illustrated by lantern slides which showed the various methods of charging cupolas by machine. Dr. Moldenke called attention to the fact that in using these machines it frequently happened that the charge in the cupola was uneven, because the coke and iron all went to one side of the cupola. He described a rather interesting method of cupola charging which he had witnessed in a southern foundry. In this plant the charges were loaded into a bucket with a drop bottom which was drawn into the cupola and the charge dropped and as a result the bed of the cupola was always even.

Mr. Brandon stated that the drawback mentioned by Dr. Moldenke in the use of charging machines could be easily overcome by the manipulation of the air controlling the charging machine. It was within the power of the operator to give the charge any impetus desired, which resulted in spreading the contents evenly.

A paper by J. B. Nau, New York City, entitled "Progress in Heated Foundry Mixers," was read by title, as was also the paper by John M. Perkins of St. Louis, on "Defective Castings."

E. H. Mumford, in presenting his paper, "Molding Machine Practice," suggested that a commission or board of experts on molding machines ought to be appointed to select the best machines for the various classes of work

the fine grains desirable. One phenomenon he mentioned was that if the casting were left a little too long in the mold, it was chilled, while if it were removed to exposure to an atmosphere of 40 or 50 deg., no chill resulted. The casting has to be taken out before contraction has taken place and it has to be bumped out, as Mr. Custer expressed it. In referring to blow holes he emphasized that iron high in manganese and sulphur was of course especially given to developing blow holes, and a cure for the blow-hole question generally was to provide a trap in the gate. Manganese is to the permanent mold, he said, what high sulphur is to the sand casting.

Numerous practical details of foundry operation, giving useful hints regarding what are sometimes regarded as the little and insignificant things, were discussed in an interesting paper by Benj. D. Fuller, Cleveland, Ohio, entitled, "A View of the Foundry at Close Range."

A paper on "Coremaking and Core Machines" was read by Archie M. Loudon, Elmira, N. Y. "Of late years," he said, "we have had the benefit of several ingenious machines enabling us to produce cores at a fraction of the cost of hand-made ones of the same character. The latest development," the author added, "is a power ramming roll-over core machine, practically an automatic core-maker, turning out work of almost any size and shape, up to 18 in. width and 32 in. length, by 12 in. depth, with the option of using smaller cores by duplicate boxes at one



JOSEPH T. SPEER.

Re-elected President, American Foundrymen's Association.



DR. RICHARD MOLDENKE.

Re-elected Secretary, American Foundrymen's Association.

for which they were designed and to adopt them as standard. He also added that he thought the future development in molding machine practice would be in the handling of the molds rather than in the making of molds.

A paper by John Alexander, Philadelphia, Pa., on "Machine versus Hand Molding," was read by title.

Permanent Molds

A paper which engaged much interest was read during the Wednesday morning session, on "The Permanent Mold," by Edgar A. Custer, Philadelphia, Pa. Comprehensive treatment of the paper will have to be deferred at this writing, but the author emphasized the desirable physical characteristics acquired by castings made in permanent molds, the continuous operation possible, the large output per unit of space, the practicability of employing even inexperienced operatives and the low unit cost per pound of casting.

In the discussion Mr. Custer explained that he did not like hot iron and that bulk is desired in the mold to absorb the heat instantly if that were possible. The casting is removed when, say, there is an exterior solidification or skin 2 or 3 in. thick; then the hot interior in the attempt to swell will as a result of the internal pressure develop

operation. The cost of making cores with this machine is anywhere from one-fifth to one-tenth that of making these cores by hand."

The recovery of the "Waste Sands of the Foundry" was described in a paper by S. A. Capron, Westfield, Mass., presented in abstract. The author called attention to core-sand washing machines as a practical means of securing economy by cleaning waste core sand and returning a large part of it as a new supply.

The washed sand is free from all objectionable substances and satisfactory for use. Not over 20 per cent. of new sand is required to keep the total amount at the same quantity. These machines involve a water process like that of the cinder mill, familiar in modern foundry practice. It is based on the natural separation of sharp sand from any foreign substances, which occurs quite generally in any slowly moving current of water. In the operation 15 or 20 cu. yd. of waste material can be handled in 10 hours. The production of perfect core-sand from this amount will vary from 80 per cent. to 90 per cent. The balance is recovered in the settling basin, and brings the total available sand up to about 95 per cent. By washing worn molding sand it has been found possible to separate 25 per cent. of good core-sand from the fine grade of Albany stove plate.

Core-sand washing machining machines should run slowly, turning 9 to 15 times in a minute according to the grade of sand and requiring about 3 hp. for this at these speeds. The water used is about 10 cu. ft. to 1 cu. yd. of waste handled, and an arrangement could easily be perfected whereby the water could be used over again if it were an item.

Pyrometry

An address was made by Dr. S. H. Stupakoff, Pittsburgh, on the selection and use of pyrometers. He described the various types of pyrometers on the market, including that employing silica or quartz terminals and making unnecessary the use of the brittle porcelain covering commonly a feature of thermal electric high-temperature indicating apparatus. The other forms of apparatus referred to were: the water pyrometer, such as has been used in steam boiler trials, involving the use of some incombustible of known weight and specific heat which is plunged into a pail of water or other and better form of calorimeter; clay cones such as are in regular use in potteries; electric resistance pyrometers, which he emphasized should not be used for temperatures over 1500 deg. F., as platinum for instance, undergoes a change of resistance when it is over exposed to high temperature; the optical method of closely estimating the temperature, which, however, brings in the question of personal error, and the radiation pyrometer, which is not calculated to give strictly accurate readings when the heat has a chance to be dissipated in part by convection, as would be the case in a temperature measurement in the open air, and which requires perhaps a minute or two for focussing satisfactorily the radiant heat.

It is proper for *The Iron Age* here to add that the Bristol Company, Waterbury, Conn., is about to introduce a pyrometer especially adapted to temperature indication of molten metal. It employs two graphite pencils, slightly differing from each other, 4 or 5 in. long and about $\frac{1}{4}$ in. in diameter. These are mutually insulated and the electric circuit for the thermal electric impulse is closed through the molten metal itself. For such slow disintegration or destruction of the graphite as may take place, new pencils may be inserted. The material into which the graphite is screwed has been selected so that other thermo-electric action likely to be set up is compensated.

The Electric Furnace

A short paper, mentioning that the electric furnace was capable of improving the quality of foundry iron, was presented by Dr. P. Heroult, New York City, in part as follows:

The main feature of what is called strong iron is the low content of sulphur. The removal of sulphur is one of the easiest and most effective operations that can be performed in the electric furnace. It consists simply in pouring into the furnace a charge of molten pig iron, if possible direct from the blast furnace; if not, from a cupola or other melting apparatus, then heating the metal under a basic slag which does not have to be scraped or removed except when it is teemed into a ladle with the metal ready for pouring. The contents in carbon, silicon, manganese and phosphorus are not affected by this operation unless this be desired. Common bessemer iron worth anywhere from \$10-\$14 per ton can be changed into strong iron, charcoal iron, car-wheel iron, or so-called cold-blast charcoal iron for a cost of about \$1 per ton.

Open Hearth Steel Foundry Practice

A paper was read by Walter MacGregor, of the American Steel Foundries, Chicago. It gave a comprehensive lot of figures on the proportions and design of the small open hearth furnace for steel castings, using oil burners.

A paper on open hearth steel foundry practice was read from manuscript by R. E. Bull, Granite City, Ill. It explained that with the basic process 450 heats could be run with only incidental attention for upkeep while with the acid furnace 600 heats were possible under the same conditions. The author felt that oil burners were often not given the proper atomization and the use of oil meters, he asserted, would do much to encourage the use of economical burners. He advocated the use of recording thermometers and pressure gauges to obtain and maintain the best conditions. For superior castings he championed the basic furnace and claimed better results with the copeless molds. He considered that the shrinkage of steel castings did not augur well for the use of permanent molds. He regarded the fuel oil flame as more economical and satis-

factory for core ovens than coke. He placed the annealing temperature at 800 deg. Centigrade (1475 deg. F.) The loss in bad castings, he said, was 4 per cent. for daylight operation only and 6 per cent. with day and night operation. He exhibited a sample heat report diagram giving details of every heat, and these he regarded as very helpful auxiliaries. He mentioned that the deleterious effect of slag resting on the metal was met by the use of thermit with silicon. As little as 2 in. of slag on the ladle did not, he said, produce any harm, but 5 or 6 in. did. He has also experimented with carbo, using 20 lb. in a 25 ton ladle; the addition of carbon did not exceed one or two points. The material, he stated, is 93 to 95 per cent. carbon and a product of refined petroleum sometimes known as petroleum coke.

Converter Steel Castings

The manufacture and annealing of converter steel castings were discussed in an extemporaneous address by Bradley Stoughton, New York. He regarded annealing as not always necessary, but it helped, he admitted, to secure the best grains and added to the strength and ductility of the metal. He regarded the pyrometer and microscope both as important apparatus in annealing work. The following covers in brief some of the features of the address:

Ingotism, caused by casting too hot or cooling too slowly, is not always obliterated by heat treatment.



H. D. MILES,
Vice-President, American Foundrymen's Association.

The coarse grains will persist. Double annealing is necessary. The second treatment is necessary at a point just above the critical temperature. With slow cooling between 1600 and 1200 deg. F., the crystals will be thick. The aim is to cool the steel rapidly through the critical range. Sagger cones are valuable in ascertaining the correct temperature conditions. A horse-shoe magnet may also be employed. There is a loss of power of attraction by the magnet at a temperature below which the rapid cooling is to be stopped. Silicon in the pig iron varies tremendously. It is better at $1\frac{1}{4}$ or $1\frac{1}{2}$ per cent. going to the converter. It causes waste as it produces slag—silica and oxide of iron largely. It increases the length of blow and therefore entails a loss and the silicon oxide represents heat that is wasted. Three blows an hour he recommended for the converter. A converter for castings averaging over 100 lb. cannot compete with the open-hearth plant. It can make smaller castings to better advantage. Its product ought to get better prices. Money loss can be withstood in view of the large tonnage. Open-hearth furnace operators seldom know what it costs to make small castings. Converter foundries have as a rule insufficient capital. They are prone to rush into the business owing to the low initial cost relatively of the plant. Open hearth and converter foundries ought to

divide business on the basis of the size of the castings. Basic open-hearth furnaces, to make small castings, must work under high temperature and this, with attending large slag production, brings about the trouble experienced with slag.

A paper was read by Charles V. Slocum, Pittsburgh, on "Titanium in Steel Castings." It will be found reviewed at some length in this issue.

A lantern slide discussion of the practicability of the electric induction furnace for making steel castings was presented by C. H. von Baur, New York City. He described the installation and cost of operation of furnaces of the "Röchling-Rodenhauser type and called attention to the fact that it allowed for regulating the chemical constituency of the metal independently of its temperature. The cheapest steel scrap, he added, can be made into quality steel at low cost.

An important contribution to the study of the microscopic structure of iron and steel was made by Prof. William Campbell, New York City, who employed lantern slides for illustration.

Vanadium in Castings

A paper was read on the Thursday morning session of the American Foundrymen's Association by G. L. Norris, American Vanadium Company, Pittsburgh, Pa., on "Vanadium in Iron and Steel Castings." Emphasis was placed on the fact that vanadium was not a cure-all for the ills to which cast material is heir and while it is a scavenger, it is an expensive one. Its chief value is regarded as making a fine grain material, tough and workable, with the graphite well distributed and specially adapted to cylinder castings and the like. Dr. Moldenke had found that the strength of white castings was increased three times when vanadium remained in the iron, testing without and with at 1000 and 3300 lb., respectively. It was also brought out in the discussion that while added strength was a result of the use of vanadium, the wearing qualities yet remained to be determined, awaiting the lapse of sufficient time to give a proper indication.

A comprehensive paper illustrating by means of lantern slides the wide scope and the possibilities of the application of electric motors for driving machinery in the foundry was read by Brent Wiley, Pittsburgh.

A New Blower for Cupola Use

A new blower for cupola use was brought to the attention of the convention through a paper illustrated with



W. M. CORSE.

Re-elected Secretary American Brass Founders' Association.

lantern photographs presented by R. H. Rice, of the General Electric Company, Schenectady, N. Y. It is a centrifugal air compressor, in the words of the author, and in-

volves a rapidly rotating wheel of remarkably small face or depth and with relatively large clearance at the sides and tips of the blades. This fact was emphasized as greatly minimizing resistances in operation. Stationary



L. W. OLSON.

President, American Brass Founders' Association.

vanes form passages around the periphery of the wheel through which air thrown by the centrifugal action is slowed down and the velocity head transformed to a pressure head suitable for use in cupola work. The author showed a six-stage blower built on the same type directly connected to a steam turbine for use in blast furnace work. He claimed that there was extreme steadiness of air pressure produced by the centrifugal blower. He explained also that the machine had only two bearings, both automatically lubricated, and the large clearance of the rotating element allowed for direct connection to the electric motor. With regard to the usual assumption that 30,000 cu. ft. of air are required for 1 ton of iron, he asserted that actually the amount of air is no more than 24,000 cu. ft., and he felt the reason the higher figure had so wide acceptance was that it was the result of the calculation of the output of the commonly used cupola blowers based on displacement alone.

A Treatise on Pattern Making

An extended paper on pattern making and pattern equipment was read by W. S. Giele, of the Harrison Safety Boiler Works, Philadelphia. It is a valuable collection of data obtained from manufacturers in widely differing industries and relating to the pattern department, and it is practically a treatise on the best in pattern shop practice. Among other things, the author emphasizes that the capable workman can work much faster with his head than with his hands and his skill and manual dexterity are applied to the best advantage when devoted to the intelligent handling of mechanical equipment specially adapted to patternmaking.

What may be styled a companion paper to that of Prof. Campbell was presented at the close of the Thursday morning session by W. P. Putnam, Detroit Testing Laboratory, Detroit, Mich., entitled "The Physical and Chemical Characteristics of Malleable Iron." Lantern photographs were used to show the effect of annealing. The author asserted that the average foundry over anneals, but admitted that errors in casting were sometimes overcome by annealing. He showed records indicating the presence of more graphite carbon at the bottom than at the top of the annealing pots. One specimen of malleable iron he had found to give over 21 per cent. elongation with 15 per cent. reduction in area and had a tensile strength of 53,283 lb. per square inch and an elastic limit

of 37,195 lb. In another specimen on heating above the critical temperature, a condition of 0.83 graphitic carbon was chargeable to 0.60 combined carbon and 0.23 graphic carbon.

The last session of the meeting, on Friday morning, was introduced with the reading by Thomas D. West, of his paper on "Gas Cavities, Shot and Chilled Iron in Iron Castings." This is reviewed at length elsewhere in this issue. Charles V. Slocum considered the paper as the clearest exposition he ever read of the cause of cold shot and regarded it as a valuable addition to the literature of the foundry.

Titanium in Malleable Iron

A paper on "Titanium in Malleable Iron" was read by C. H. Gale, Pressed Steel Car Company, Pittsburgh. He described the results of tests made with bars given in some cases $\frac{1}{8}$ per cent. of titanium, in some others $\frac{1}{4}$ per cent. of the titanium alloy, and in others none at all. Tests for the tensile strength and for elongation did not show any advantage with the addition of the alloy. For example, the untreated specimens showed about 47,000 lb. per square inch tensile strength, those with 0.125 per cent. alloy showed 44,000 lb. tensile strength and those with 0.25 per cent. showed about 43,000 lb. tensile strength. The elongation for the three cases were on the average 6, 3 and 2 per cent., respectively. Transverse tests were quite different. Where the untreated specimens fractured at 1180 lb. between 12-in. supports, the transverse tests for the smaller amount of the alloy in some cases extended beyond the range of the testing machine. Later investigation covered the addition of a less amount of titanium, in one case 0.03 per cent. and in another case 0.06 per cent. In these specimens no titanium remained in the bars. Titanium, when used in large quantities for purification, allows the graphite to separate and allows the silicon to run low and gives good soft castings and such he felt was the value of titanium in malleable iron.

W. D. Alexander, of the Albany Malleable Iron Company, Albany, N. Y., mentioned briefly an extended series of tests he was conducting along the same line. He found that when, for example, the amount of the alloy was about 0.47, there was an advantage in favor of the treated metal, but when there was 1 per cent. and so on up to 1.75 per cent., the results were in favor of the untreated specimens. He has now under investigation, test pieces with 0.4 to 0.6 per cent. titanium alloy. He believes that the benefit will show in favor of large castings.

New Officers and Place of Next Meeting

The election of officers of the American Foundrymen's Association occurred on the Friday morning session. In the Thursday morning session, President Speer had appointed the following committee on nominations: W. H. McFadden, Pittsburgh, chairman; L. L. Anthes, Anthes Foundry Company, Toronto; A. T. Waterfall, Russell Wheel & Foundry Company, Detroit; E. H. Mumford, Mumford Molding Machine Company, New York, and A. E. Howell, Phillips & Butorff Mfg. Company, Nashville, Tenn. At the same time he appointed as auditing committee: William Yagle, Lawrence Iron & Steel Foundry Company, Pittsburgh, and W. A. Bole, Westinghouse Machine Company, Pittsburgh.

The report of the nominating committee was unanimously adopted and the following are the officers:

President, Major J. T. Speer, Pittsburgh Valve Foundry & Construction Company, Pittsburgh, Pa.

Vice-President, first district, F. B. Farnsworth, New Haven, Conn.

Vice-President, second district, W. D. Miles, Buffalo Foundry & Machine Company, Buffalo, N. Y.

Vice-President, third district, Walter Wood, R. D. Wood & Co., Philadelphia, Pa.

Vice-President, fourth district, Alfred E. Howell, Phillips & Butorff Mfg. Company, Nashville, Tenn.

Vice-President, fifth district, R. E. Bull, Granite City, Ill.

Vice-President, sixth district, T. W. Sheriff, Sheriff Mfg. Company, Milwaukee, Wis.

Vice-President, seventh district, D. R. Lombard, Lombard Iron Works & Supply Company, Augusta, Ga.

Vice-President, eighth district, S. B. Chadsey, Massey-Harris Company, Toronto, Ont.

Chairman McFadden explained that he had purposely omitted the nomination for the secretary-treasurer, and forthwith paid a graceful tribute to Dr. Richard Moldenke and offered his name in nomination for the office of secretary and treasurer. Dr. Moldenke, in a short, happy speech succeeding his unanimous election, referred to the fact that he was now entering on the eleventh term.

On motion of Mr. Howell, the constitution was amended to allow for a permanent standing advisory committee by constituting the past presidents as such a committee and ex-officio members of the executive committee.

On motion of J. S. Seaman, who was later introduced for an address, as the father of the association, Buffalo, N. Y., was selected as the place for the next meeting.

Closing Felicitations

A resolution offered by L. L. Anthes, Toronto, was adopted expressing appreciation of the efforts of the officers of the association and of the officers of the Pittsburgh Foundrymen's Association in so successfully conducting the convention. The resolution also incorporated extended reference to the activities of Dr. Moldenke, who, as Mr. Anthes expressed it, has probably done more than



N. K. B. PATCH.

Retiring President, American Brass Founders' Association.

any one else in the world for the development of scientific foundry practice. It also paid special attention to the efforts of H. E. Field, Pittsburgh, who, as chairman of the committee on papers, helped materially in making it the banner convention, and who succeeded in arousing the conspicuous interest of the steel foundries. Special attention in the resolution of thanks was paid to the plant visitation committee and to the manufacturers who had opened their doors to the visitors.

On motion of W. P. Putnam, the convention decided to appoint a committee to work with committees of the American Society of Automobile Engineers and the American Brass Founders' Association on the matter of uniform report cards on tests of material.

There were a number of papers which had to be read by title only, owing to lack of time for discussion. They included "Foundry Construction," by George K. Hooper, New York City; "The Equipment of Air Furnaces Using Oil as Fuel," by N. W. Best, New York City; "Manganese and Silicon in the Foundry," by A. E. Outerbridge, Jr., Philadelphia, and "The Foundry Foremen's Educational Movement," by D. O. Wilson, Newark, N. J.

The Brass Founders' Sessions

In the absence of President Batch, of the American Brass Founders' Association, who was unable to attend the convention this year, the chair was occupied by L. W. Olsen, Mansfield, Ohio. The first paper presented was on "The Analysis of Manganese Bronze," by J. R. Huber, Buffalo, N. Y. Mr. Olsen, in discussion, asked to what extent the analysis of manganese bronze could be taken as an index of its physical character. Mr. Huber replied that it was possible to form a table by means of which the physical qualities of the metal could be determined by its chemical composition. Mr. Webster then explained that the physical qualities of manganese bronze varied greatly with the different percentages of copper; also that variations in the content of tin and iron greatly influence the quality of the metal; and that, in consequence, the chemical composition can be taken as an index of quality only when all conditions are the same in making the bronze.

In replying to a question of the effect of rapid cooling on manganese bronze, Mr. Corse said some people believed a difference of 50 per cent. in strength existed between chill and sand castings, which was erroneous. The tensile strength of a chill casting might be 80,000 lb. per square inch, as against 75,000 lb. from the same alloy cast in sand.



C. E. HOYT.

Secretary, Foundry & Machine Exhibition Company.

Melting Ratios in Brass Foundries

"The Corrosion of Brass Foundry Products," by William Vaughan, Boston, Mass., was the next paper presented, and this was followed by the paper "Efficiencies of Furnaces," by Dr. J. W. Richards, South Bethlehem, Pa. Summarized briefly, the paper applied itself to the ratio of fuel to output, and gave a number of examples. In requesting information relative to the melting ratios of brass furnaces, Mr. Webster stated that in using anthracite coal the ratio was from $2\frac{1}{2}$ to 3 lb. of metal melted per pound of fuel.

Mr. Corse stated that with coke, the average was 45 lb. of fuel to 100 lb. of metal. Mr. McKimmon stated that in a Steele-Harvey furnace he had melted 900,000 lb. of bronze for light castings at an average consumption of $3\frac{3}{4}$ gal. of oil per 100 lb. of metal. The metal charged was $1/9$ th borings, and the loss in melting and subsequent grinding was 4.6 per cent. The cost of the oil averaged 18 cents for $4\frac{1}{2}$ gal. It was stated also in the discussion that the fuel consumption in a Charlier furnace averaged 3 gals. of oil per 100 lb. of metal.

N. K. B. Patch, Lumen Bearing Company, Toronto, Ont., president, was in the chair for the Wednesday ses-

sion. A committee was appointed to nominate officers for the association for the coming year, as follows: H. B. Webster, chairman; J. L. Jones, W. L. Abate, J. G. Kasjens, and F. W. Reidenbach.

A paper was read by H. W. Gillett, Aluminum Castings Company, Toronto, Ont., entitled "The Pyrometer and the Aluminum Foundry," and elicited considerable discussion.

A paper was presented by C. Powell Karr, Walworth Mfg. Co., South Boston, Mass., entitled "Pouring and Melting Points of Some High-Grade Bronzes." There was also considerable discussion on this paper.

Secretary Corse announced that the joint sessions of the American Brass Founders' Association and the American Foundrymen's Association were found to be unsatisfactory for the reason that so many papers were to be read at the sessions of the latter organization there was not time properly to present the papers and have the desired discussion by members of the American Brass Founders' Association. For this reason the paper originally scheduled to be read in joint session on Thursday morning by E. A. Barnes, Fort Wayne Electric Works, Fort Wayne, Ind., was read at the Wednesday afternoon meeting. This paper was entitled, "Non-Ferrous Foundry Economics and Refinements." Mr. Barnes showed photographs of a number of new machines recently added to the foundry of his company, and stated that by reason of the many conveniences afforded, they were able to get employees of the very highest ability.

The Friday morning session of the American Brass Founders' Association was devoted to papers by Prof. S. W. Parr, of the University of Illinois, on "The Determination of Nickel in Alloy;" and the paper by Jesse L. Jones on "The Effect of Repeated Melting on Manganese Bronze."

The result of the election of officers is as follows:

President, L. W. Olson, Ohio Brass Company, Mansfield, Ohio.

Secretary, W. M. Corse, Lumen Bearing Company, Buffalo, N. Y.

Vice-Presidents: New Jersey district, John F. Thompson, Orford Copper Company; New York district, R. T. Roberts, National Brass & Copper Tube Company, Hastings-on-Hudson, N. Y.; New England district, P. T. Augenbraun, Yale & Towne Mfg. Company, Stamford, Conn.; Pennsylvania district, G. H. Clamer, Ajax Metal Company, Philadelphia, Pa.; Illinois district, Philip Mueller, H. Mueller Mfg. Company, Decatur, Ill.; Chicago and Northwest, R. C. Faunt, Faunt Brothers, Chicago; Michigan, Ohio and Indiana, H. W. Gillett, Aluminum Casting Company, Detroit; Virginia and the Southwest, John C. Sharp, Sharp Brass Works, Chattanooga, Tenn.; Ontario and the Western Provinces, N. K. B. Patch, Lumen Bearing Company, Toronto, Ont.; Quebec and the Maritime Provinces, R. R. Mitchell, Robert Mitchell Company, Ltd., Montreal, Que.

The Associated Foundry Foremen

At the annual meeting of the Associated Foundry Foremen, held contemporaneously with the other foundrymen's meetings, the following officers were elected:

President, Robert B. Thompson, Buffalo-Pitts Company, Buffalo, N. Y.

Vice-President, Wm. H. Woods, Pennsylvania Railroad, Altoona, Pa.

Secretary, Hugh McPhee, Tarrytown, N. Y.

A banquet was tendered the visiting foundry foremen by the Pittsburgh Foundry Foremen's Association at the Fort Pitt Hotel Wednesday evening. Professor C. B. Connelly, of the Carnegie Technical Schools, presided as toastmaster. The address of welcome was delivered by W. H. Wood, president of the Pittsburgh Association and replied to by Robert Thompson of Buffalo, president of the Associated Foundry Foremen.

Secretary Hugh McPhee, of the Associated Foundry Foremen, told of the progress of the association during the year, saying that the Pittsburgh Association, although but one year old, was now numerically stronger than any of the other branches and urged upon local members the benefits to be derived from attendance at meetings and close attention to the educational papers presented.

Major Speer, president, and Dr. Moldenke, secretary of the American Foundrymen's Association, spoke of the

work and aim of their association, and Secretary Tracy, of the Buffalo Chamber of Commerce, extended a cordial welcome for the Allied Conventions in their city in 1912.

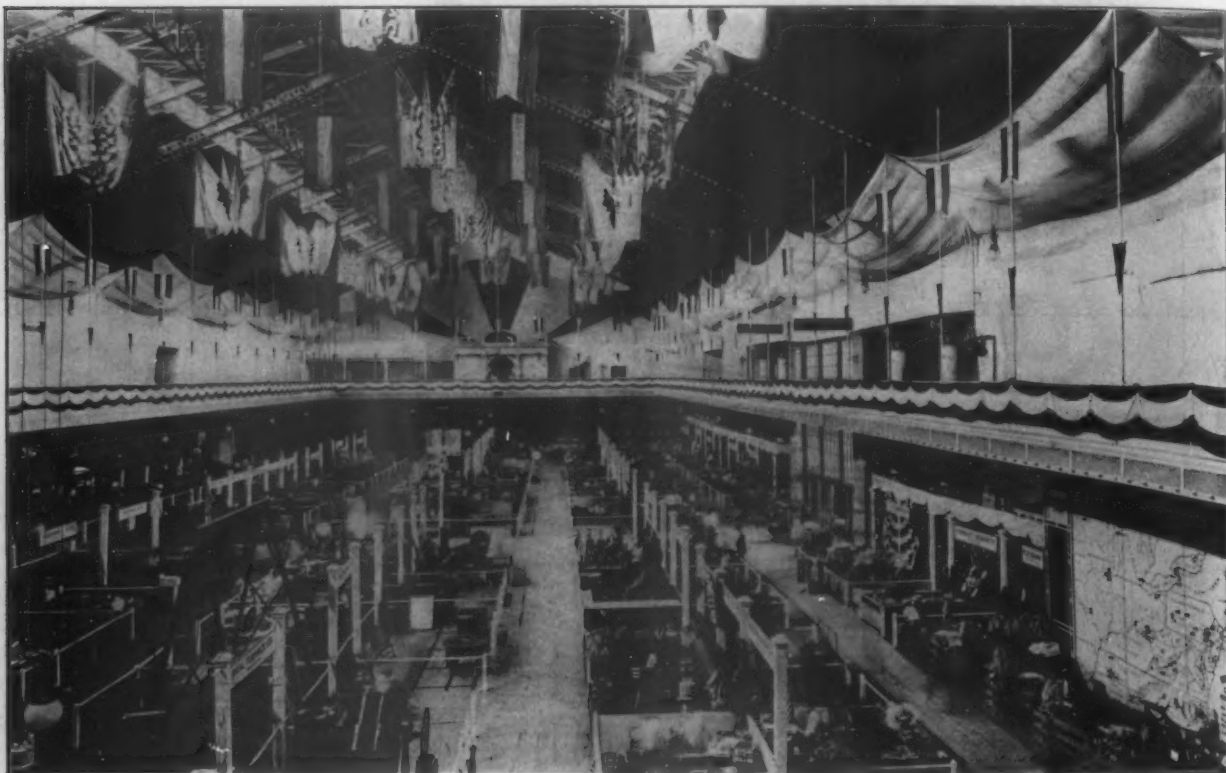
Director A. A. Hammerschlag, of the Carnegie Technical Schools, spoke of the work undertaken by that institution to assist the foundry industry and urged the foundry foremen to change their methods of producing first class apprentices by giving them the benefit of the technical and practical education offered by the school and assist those growing up in the foundry business in their aspiration for higher education. He urged up those present to welcome the installation of labor-saving devices and said that it was a mistake to endeavor to double tonnage production at the same relative tonnage cost as at present but that the progressive foundryman and his foreman should bend their efforts to produce a product that would double the value of present tonnage.

Rev. J. Leonard Levy urged the co-operation of those present, together with their employees, along the lines of

years ago by Westinghouse interests at Trafford City, a few miles farther on Turtle Creek, along which the name Westinghouse is displayed on industrial establishments of international importance.

At the Carnegie Steel Company's plant were seen the operation of open hearth steel furnaces, the rolling of ingots into plate, the making of slabs, blooms and billets from ingots taken from soaking pits and the rolling of structural shapes, as well as the armor plate department where steel plate as thick as 18 in. for use at the Panama Canal was being treated.

Some opportunity was also given to witness the casting of steel ingots and of course great interest was taken in the electric traveling charging machines for the open hearth furnaces. The crowds were wont to linger so long to watch the pyrotechnics and listen to the detonation of the tossed-about ingots and billets that the works police force performed a necessary service in helping keep up the time schedule planned.



View in the Main Hall of the Exhibition of Foundry Machinery and Supplies at Pittsburgh.

securing state and national boards of conciliation to eliminate labor strife, pointing out the benefit of such boards in the Dominion of Canada, where, last year, there were but 71 strikes as against 6,000 in the State of New York and 7,100 in Pennsylvania, during 1910.

Plant Visitation and Social Affairs

One of the especially enjoyable and instructive phases of the allied foundrymen's meetings was the trip made on Thursday afternoon to the works of the Westinghouse Air Brake Company at Wildmerding, Pa., to the Homestead works of the Carnegie Steel Company and to the plant of the Mesta Machine Company at West Homestead, Pa. A long special train was needed to accommodate the large number participating. The visit to the Westinghouse foundry was chiefly to view the operation of the continuous pouring plant. The daily capacity of the foundry is approximately 300 tons. The main foundry is equipped with four molding tables, each about 250 ft. long and moving around an oval track. Two of these tables move continuously and are used for small castings such as one man can handle readily. The other two tables are for heavy work and move forward only as each lot of molds is finished. The cupola is located at one end and inside of the oval track.

In the Westinghouse Air Brake foundries were also seen a number of Tropenas converters at work and also the practice followed in core making. The plant is not to be confounded with the modern foundry opened a few

Interests at the model Mesta Machine Works centered in a large casting requiring metal from three furnaces and the casting of the half of a 20-ft. blowing engine wheel, weighing, for the half, 28,000 lb. The large casting was 39 ft. 4 in. long, 52 in. in diameter, had 8-in. walls and weighed 185,000 lb. For cutting the steel risers an equipment of the oxy-acetylene blow pipe has been provided by the Linde Air Products Company, Buffalo, N. Y.

The Mesta machine plant has been described in these columns. Its attractive buildings harmonious to their purpose and the neatly kept factory yards came in for much favorable comment.

The entertainment arrangements also included automobile drives for the ladies, a vaudeville performance of remarkable merit, on Thursday evening, ticket to a National League base-ball game at the celebrated million dollar Forbes Field on Friday afternoon, and a notable subscription banquet at the Fort Pitt Hotel on Friday night.

The Exhibits

The success of the exposition was demonstrated by the large attendance, the large number of machines sold on the floor of the exhibitors' booths, and the number of firms represented with floor space. The total number of exhibits at Pittsburgh was 118, as compared with 83 at Detroit and 68 at Cincinnati. Sixty-five of the 118 exhibits showed machinery and foundry appliances in actual operation under conditions similar to those of a working

foundry. The total cost of the convention to exhibitors was close to \$250,000, this representing the freight expense on 500 tons of equipment to and from the convention, floor space in the exhibition halls and the salaries of salesmen and other employees.

A pleasing feature of the entire exhibition was the fact that a considerable proportion of the equipment shown was sold in the first four days. Several of the concerns represented found it necessary to telegraph home for additional help and more equipment. C. E. Hoyt, secretary of the Foundry & Machine Exhibition Company, and F. N. Perkins, chairman of the executive committee, received, during the last two days of the convention, inquiries from a large number of interested concerns who were not represented at this convention requesting that spaces be reserved for them at Buffalo. The attendance was somewhat greater than at the Detroit convention and represented a better interest, those attending numbering the substantial and purchasing end of foundries and machine shops and not as large a number of uninterested visitors. On Saturday afternoon and evening the foundries and machine shops in and about the Pittsburgh district sent

Jonathan Bartley Crucible Company, Trenton, N. J.:—Crucibles, retorts, stoppers and a variety of graphite specialties. Represented by Samuel H. Dougherty, Lee T. Ward, Herbert D. Cole and Lewis L. Lawton, secretary.

Berkshire Mfg. Company, Cleveland, Ohio:—Hand squeezing and pattern drawing molding machines, plain squeezers and automatic molding machines; also a full line of snap flasks, iron flasks, etc. Represented by R. H. York, J. N. Battenfeld and C. F. Battenfeld.

Charles H. Bealy & Company, Chicago, Ill.:—Bealey's pattern makers' disc grinder for wood and Bealey direct connected motor-driven grinder for metal, Helmet pressed-steel ring wheel chucks, geared lever feed tables, rotary fixture, Helmet temper taps, Helmet oil, Helmet spiral circles, Helmet cement and Helmet glue. Represented by Charles A. Knill, Wm. H. Allen, Edward P. Welles and John Miller, Jr.

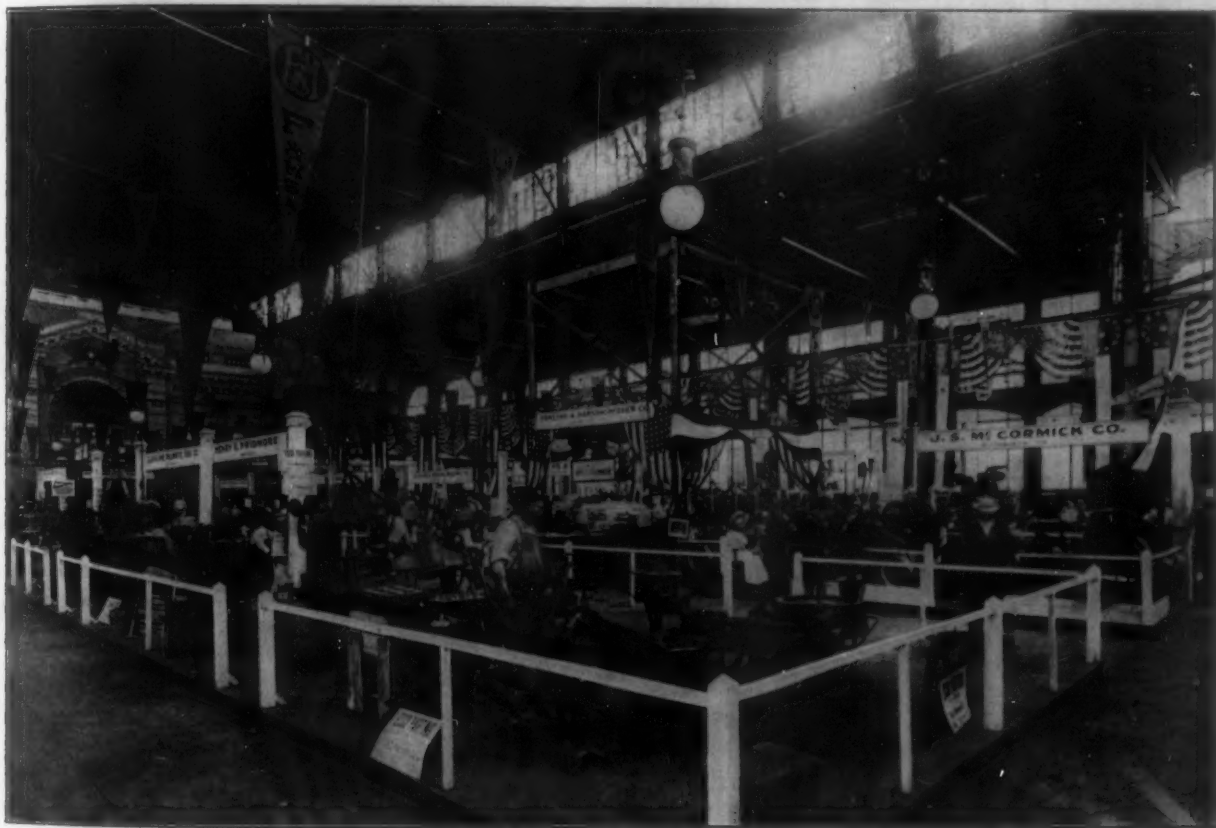
S. Birkenstein & Son, Chicago, Ill.:—Brass founders' alloys. Represented by E. E. Berliner, H. Birkenstein, J. B. Nieman and Lee Kahn.

George F. Blake Mfg. Company, East Cambridge, Mass.:—Two sizes core wiring straightening machines, dustproof, enclosed frame, splash lubricated air compressors, pneumatic sand riddles. Represented by Frederick H. Thatcher, Pittsburgh sales manager; A. F. Murray, Frank Goodman, W. B. Stamford and R. L. Radcliffe.

Blystone Mfg. Company, Cambridge Springs, Pa.:—Blystone core sand mixers. Represented by P. L. Blystone, J. F. Mather, J. A. Bolad and W. E. Wright.

Brown Specialty Machinery Company, Chicago, Ill.:—Hammer core machine and style C hammer core machine. Represented by Elmer A. Rich, Jr., and John Laycock.

A. Buch's Sons Company, Elizabethtown, Pa.:—Combination jar and squeeze molding machines, patented aluminum snap flasks, square



Part of the Exhibit of Foundry Machinery and Supplies in Machinery Hall, Pittsburgh.

several thousand of their employees to see the exhibition, these being unable to attend during the week.

LIST OF EXHIBITORS.

The Adams Company, Dubuque, Iowa:—Molding machines, squeezers, snap flasks, pneumatic rappers, spruce cutters, grinding stands, milling machines, automatic gear hobbing machines. Represented by C. E. Reich, W. J. Spensley, John Nicol, Ignatius Schweitering, John Berringer, Anton Haas, L. E. Marceau and Glenn Muffy, sales manager.

Albany Sand & Supply Company, Albany, N. Y.:—Samples of selected grades of sand for brass, aluminum and stove plate castings. Represented by L. Murray, manager; Chas. H. Bird and Arthur T. Palmer.

American Metal Market Company, New York, N. Y., and Pittsburgh, Pa.:—Represented by B. F. V. Luty.

American Vanadium Company, Pittsburgh, Pa.:—Vanadium cast steel and cast iron specimens. Represented by J. J. Flannery, president; Geo. L. Norris, Met. Engr.; C. I. Hastings and W. J. Bird.

Arcade Manufacturing Company, Freeport, Ill.:—Norcross jarring machines, modern molding machines, Arcade squeezers, Arcade Rotary sand sifter, perfect match plate hinge and the modern automatic molding machine with sand elevator and dropper. Represented by E. H. Morgan, Chas. Morgan, L. L. Munn, F. N. Perkins, R. M. Burton, W. C. Norcross, Henry Tscherning, C. D. Dolfey, Aug. Christen, John Ludolph, Joe Stevens and H. Damman.

Atlas Car & Manufacturing Company, Cleveland, Ohio:—Storage battery locomotive, new type sand blast car, portable track and side-dump sand car. Represented by R. S. Richards.

Baird & West, Detroit, Mich.:—Solvay foundry coke; joint exhibit with Pickands, Brown & Company.

and tapered, patented steel flask bars, Buch's pattern cement, bottom boards, cast iron casings, cast iron flasks for the gravity machine with bottom boards and bars, special pouring ladle with bail. Represented by R. S. Buch and George E. Bates.

Buckeye Products Company, Cincinnati, Ohio:—Parting compounds, binders, blackings, brass fluxes and core compounds. Represented by Charles A. Goehring and Edward Leisl.

Burroughs Adding Machine Company, Detroit, Mich.:—Burroughs adding machines. Represented by Ward Gavett and H. F. Happer.

Canadian Foundryman, Toronto, Canada:—Represented by H. V. Tyrrell.

Carborundum Company, Niagara Falls, N. Y.:—Carborundum and Aloxite grinding wheels, Carborundum fire sand and Carborundum rubbing bricks. Represented by George R. Rayner, W. W. Sanderson, O. C. Dobson, Anthony Dobson, J. P. McCann, C. D. Sargent and H. A. Eaton.

Castings, Cleveland, Ohio:—Represented by R. I. Clegg, H. M. Lane, G. H. Gardner, C. G. Kiser, S. R. Lewis and S. G. Krake.

Chicago Pneumatic Tool Company, Chicago, Ill.:—Franklin type GCB compound belt driven air compressors, improved Keller sand rammers, Tripod sand sifter, pneumatic geared wire rope hoists, Boyer-Keller chipping hammers, electric grinder, side spindle electric drill, Little Giant pneumatic grinder and castings cleaner, Chicago universal hose coupling. Represented by H. S. Hunter, F. J. May, D. F. Geissinger, E. N. Zwing and W. C. Walker.

Chisholm & Moore Mfg. Company, Cleveland, Ohio:—Chain hoists, trolleys, hand-power traveling cranes and malleable castings. Represented by the Machinists' Supply Company.

Clayton Air Compressor Works, East Cambridge, Mass.:—See George F. Blake Mfg. Company.

Cleveland Pneumatic Tool Company, Cleveland, Ohio:—Sand rammers, riveting and chipping hammers, air drills, emery grinder and air hose couplings. Represented by H. S. Covey, sales manager; A. Scott and J. T. Graves.

Cleveland Wire Spring Company, Cleveland, Ohio:—Steel tote boxes, steel foundry barrels, steel kegs, steel shelving, steel sprue boxes, coil wire springs. Represented by J. W. Campbell and C. H. Erickson.

Cutler-Hammer Mfg. Company, Milwaukee, Wis.:—Lifting magnet adapted for foundry use. Represented by E. E. Brossius, Messrs. Holbrook and Chesebrough.

Dalton Adding Machine Company, Poplar Bluff, Mo.:—Dalton adding machines. Represented by J. L. Dalton and H. M. Cammack.

Deane Steam Pump Company, Holyoke, Mass.:—See George F. Blake Mfg. Company.

Deming Company, Salem, Ohio:—Harris Pump & Supply Company, representative, Pittsburgh, Pa.:—Hand and Power pumps, fire extinguishers and white washing machines. Represented by George G. Raddin, W. L. Deming and F. S. Nichols.

Detroit Core Machine Company, Detroit, Mich.:—Core machines. Represented by A. N. Kelley and G. Herbert Rounsifer.

Detroit Foundry Supply Company, Detroit, Mich.:—Represented by M. S. Fox and W. Bruce Howard.

Detroit Hoist & Machine Company, Detroit, Mich.:—Pneumatic geared hoists, pneumatic motors, pneumatic winches. Represented by J. C. Fleming and F. B. Fleming.

Joseph Dixon Crucible Company, Jersey City, N. J.:—Crucibles for both brass and steel melting, special shapes and formulae for various purposes, phosphorizers, stirrers, skimmers, stoppers, nozzles, sleeves, etc., graphite refractories, foundry facings, motor

brushes and graphite products. Represented by Dudley A. Johnson in charge, F. R. Brandon, John A. Condit and Frank Krug.

Stanley Doggett, New York City:—Foundry specialties, parting compounds, manganese dioxide, soapstone, graphite facing, powdered charcoal, dioxide of manganese flux, ferromanganese, ferrosilicon, iron and steel cement, metal workers' soapstone, crayons and pencils. Represented by Stanley Doggett.

Electric Controller & Mfg. Company, Cleveland, Ohio:—Lifting magnets and controllers, automatic motor starters. Represented by J. S. McKee, J. F. Motz, H. W. Eastwood and C. E. Hanna.

Elmira Foundry Company, Elmira, N. Y.:—Power ramming roll over core machines, patent pasting and venting devices. Represented by A. M. Loudon, Thomas Jones and J. D. McCann.

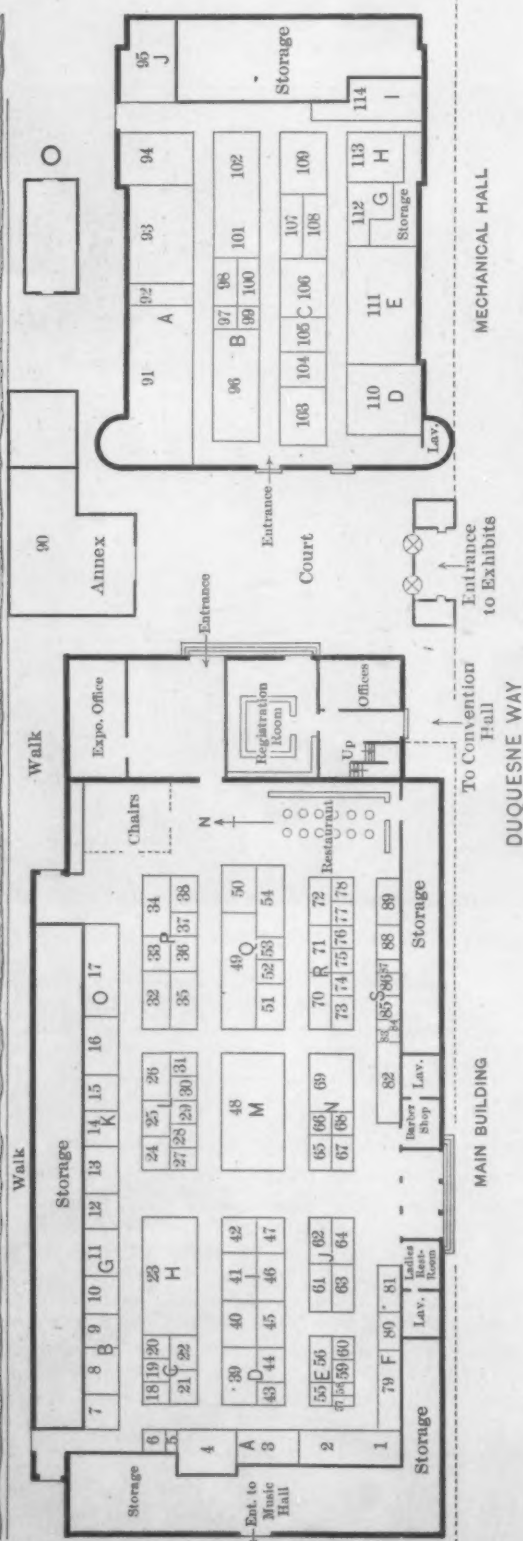
Felt & Tarrant Mfg. Company, Chicago, Ill.:—Comptometer adding and calculating machines. Represented by J. C. Nevins, S. C. Brown and W. D. Shimp.

Foundry, Cleveland, Ohio:—Magazines and books. Represented by John A. Penton, A. O. Backert, R. E. Denmore, W. A. Tenwinkel, J. C. Eppens, E. W. Word, H. A. Andresen and L. P. Sutter.

H. H. Franklin Mfg. Company, Syracuse, N. Y.:—Die casting. Represented by H. V. Skinner.

Gardner Machine Company, Beloit, Wis.:—Pattern makers' disc grinders, single head disc grinders, double head disc grinders, abrasive discs and disc grinders' supplies. Represented by F. N. Gardner, F. E. Gardner and L. W. Thompson.

ALLEGHENY RIVER



Plan of Exhibition at Pittsburgh, Held Under Auspices of the Foundry & Machine Exhibition Company.

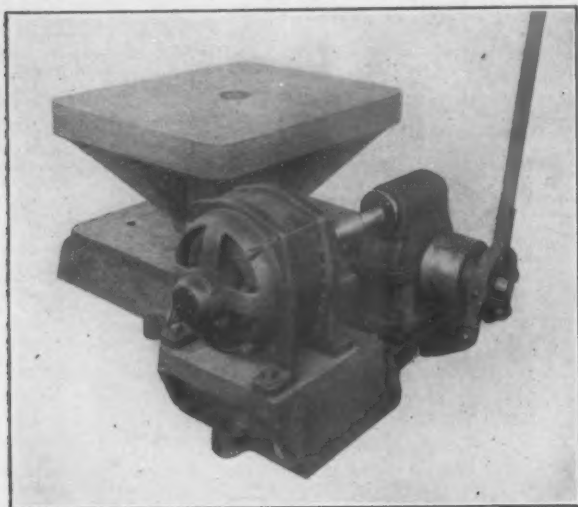
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|---|--|
| 1 & 2—Sand Mixing Machine Company. | 74—Standard Linseed Company. |
| 3—Shepard Electric Crane & Hoist Company. | 75—Midland Machine Company. |
| 4—Pickands, Brown & Hoist Company. | 76—American Metal Market Company. |
| 5—Brown Specialty Machinery Company. | 77—Superior Sand Company. |
| 6—Mott Sand Blast Mfg. Company. | 78—United States Graphite Company. |
| 7—Gardner Machine Company. | 79—Rogers, Brown & Co. |
| 8—Orenstein-Arthur Koppel Company. | 80—Stanley Doggett. |
| 9—Whitney-Kemmerer Company. | 81—McCoy & Brandt. |
| 10—Norton Company. | 82—W. W. Sly Mfg. Company. |
| 11—Cleveland Wire Spring Company. | 83—Taylor Instrument Companies. |
| 12—Carborundum Company. | 84—Canadian Foundryman. |
| 13—Elmira Foundry Company. | 85—Hunting Saw & Machine Company. |
| 14—Tate Jones & Company. | 86—Westinghouse Electric & Mfg. Company. |
| 15—International Molding Machine Company. | 87—Jonathan Barley Crucible Company. |
| 16—Ingersoll-Rand Company. | 88—Arcade Mfg. Company. |
| 17—James Jiles & Company. | 89—Osborn Mfg. Company. |
| 18—H. H. Franklin Mfg. Company. | 90—Herman Pneumatic Machine Company. |
| 19—Graf Molding Device Company. | 91—Mumford Molding Machine Company. |
| 20—Blystone Mfg. Company. | 92—Standard Sand & Machine Company. |
| 21—Graceton Coke Company. | 93—Henry E. Fridmore. |
| 22—Adams Company. | 94—Cleveland Pneumatic Tool Company. |
| 23—Sterling Wheelbarrow Company. | 95—Pittsburg Steel Foundry. |
| 24—Pittsburg Valve, Foundry & Construction Company. | 96—Rockwell Furnace Company. |
| 25—Whiting Foundry Equipment Company. | 97—Berkshire Mfg. Company. |
| 26—Hill & Griffith Company. | 98—J. S. McCormick Company. |
| 27—Frederic B. Stevens. | 99—William Sellers Company, Inc. |
| 28—Detroit Foundry Supply. | 100—E. Killings Holding Machine Works. |
| 29—S. Obermayer Company. | 101—J. B. Wise. |
| 30—Hawley Down Draft Furnace Company. | 102—Monarch Engineering Works. |
| 31—Hauk Mfg. Company. | 103—Hanna Engineering Works. |
| 32—Hauk Mfg. Company. | 104—Mott & Merryweather Machinery Company. |
| 33—Hauk Mfg. Company. | 105—Hauk Mfg. Co. Cast Tool Co. |
| 34—Hauk Mfg. Company. | 106—Lawler Improved Jarring Machine Co. |
| 35—Hauk Mfg. Company. | 107—Robinson Automatic Machine Co. |
| 36—Hauk Mfg. Company. | |
| 37—Hauk Mfg. Company. | |

- General Electric Company, Schenectady, N. Y.
- Goldschmidt Thermit Company, New York, N. Y.:—Full line of metals produced free from carbon, heating Thermit cans, titanium Thermit cans, Thermit welding process and appliances. Represented by Wm. C. Thumt, E. A. Beck, H. S. Mann and Wm. R. Hulbert.
- Graceton Coke Company, Graceton, Indiana County, Pa.:—Foundry coke. Represented by C. M. Lingle, general manager.
- Graf Molding Device Company, Louisville, Ky.:—Aluminum roll-up match plates, hingeless snap flasks. Represented by T. H. Graf and A. N. Webb.
- Hanna Engineering Works, Chicago, Ill.:—Rathbone multiple molding machine, pneumatic shakers, oscillating riddle, riddler, sand blast machines, revolving dumping riddle, mold dryer and Hanna riveter. Represented by W. L. Laib, James T. Lee and F. H. Scantlebury.
- Harbison-Walker Refractories Company, Pittsburgh, Pa.:—Ordinary shapes and standard cupola blocks in fire brick. Represented by Hay Walker, J. J. Brooks, Jr., K. Seaver, J. E. Morgan, W. N. McKnight, V. A. Giesey, G. S. Troxell and S. A. Bixler.
- Hauck Manufacturing Company, New York City, N. Y.:—Oil burning appliances, including cupola lighters, ladle heaters, core oven and furnace burners, mold dryers, preheating and brazing outfits. Represented by A. E. Hauck, A. P. Link, A. H. Stein and H. E. Giersch.
- Hawley Down Draft Furnace Company, Chicago, Ill.:—Metal melting furnaces. Represented by F. O. Bartlett, H. J. Stow, D. J. O'Brien, H. E. Schwartz and C. M. Bleyer.
- Herman Pneumatic Machine Company, Zelenople, Pa.:—Herman jar ram stripping plate machine, Herman jarring molding machines with roll-over and pattern drawing device, Herman jarring molding machine known as bumper. Represented by A. M. Fraunheim, M. L. Heyl, Charles Herman, Alfred Herman, Andrew Rodgers and C. E. Pettet.
- Herruth Core Oil Company, Chicago, Ill.:—Small electric core oven and Herruth core oil. Represented by George A. Hummelbaugh.
- The Hill & Griffith Company, Cincinnati, Ohio:—Represented by John Hill, John Glass, William Oberhelman and Harry Taylor.
- Hunter Saw & Machine Company, Pittsburgh, Pa.:—Hunter solid tooth saws, Hunter inserted tooth saws and saw sharpening machines. Represented by F. A. Hunter, J. A. Carrothers and G. W. Agerter.
- Ideal Furnace Company, Chester, Pa.:—Brass melting furnaces. Represented by P. J. Sweeney.
- Ingersoll-Rand Company, New York City, N. Y.:—Twelve-in. stroke NE-1 air compressor, pneumatic chipping, caulking and scaling hammers, pneumatic riveting hammers, sand rammers for bench and floor work, pneumatic motor hoists, pneumatic stationary motors and pneumatic piston and rotary drills. Represented by W. H. Armstrong, W. A. Armstrong, E. P. Mooney, H. E. Metcalf, W. B. Brendlinger, James Moran and J. L. Kelley.
- International Molding Machine Company, Chicago, Ill.:—Light and heavy designs of stripping plate machines, turn-over draw machines, core-making machines and squeezers. Represented by Edward A. Pridmore, W. W. Miller and J. W. Dopp.
- Interstate Sand Company, Zanesville, Ohio:—Molding sand for iron and steel molding. Represented by L. K. Brown and E. M. Ayers.
- Iron Age, New York City, New York:—Represented by W. H. Taylor, A. I. Findley, M. C. Robbins, Fritz Frank, D. C. Warren, W. B. Robinson, Robert A. Walker, Adrian Lazare and Geo. H. Griffiths.
- James Jiles Company, Pittsburgh, Pa.:—Molding loam and core sand, common loam for open-hearth furnaces, etc. Represented by John W. Jiles and C. L. Kelly.
- Keystone Coal & Coke Company, Pittsburgh, Pa.:—Coal and coke. Represented by E. M. Gross, W. F. Elwood and A. F. Syroth.
- E. Killing's Molding Machine Works, Davenport, Iowa:—Stripping plate machine, roll-over machine, multiple cylinder plain jarring machine, jarring rock-over machine, two sizes, automatic squeezer. Represented by E. Killing, A. W. Fox, C. P. Aabye and George Heck.
- Lawlor Improved Jarring Molding Machine Company, Pittsburgh, Pa.:—Lawlor improved jarring molding machines. Represented by Ralph W. Hills, Robert Sweeney and J. J. Lawlor.
- David Lupton's Sons Company, Philadelphia, Pa.:—Lupton steel sash for side walls, Pond continuous sash for monitor and saw-tooth roofs, Lupton rolled steel skylight and photographs and drawings of designs for foundry and forge shops. Represented by Clarke P. Pond, sales manager, and W. C. Scott.
- J. S. McCormick Company, Pittsburgh, Pa.:—One 5-ton and one 10-ton McCormick continuous sand screen and mixing machine, model cupola, general foundry supplies and facings. Represented by J. S. McCormick, T. E. Malone, S. R. Costley and R. H. Mills.
- McCoy & Brandt, Pittsburgh, Pa.:—Motor starters and controllers manufactured by Allen-Bradley Company, Milwaukee, Wis. Represented by H. E. McCoy.
- Metal Industry, New York City, N. Y.:—Magazines, books and pamphlets. Represented by Palmer H. Langdon, Louis I. Krom, George W. Cooper, Thomas A. Trumbour, Edward B. Fritz and F. Wilkes.
- Midland Machine Company, Detroit, Mich.:—Hand rammed roll-over molding machines, foot roll core machines. Represented by George L. Grimes.
- Monarch Engineering & Mfg. Company, Baltimore, Md.:—Latest improved furnaces using oil or gas as fuel for melting and heating, Acme core oven, steel foundry ladle, heating equipment, aluminum furnaces, Alls' Eclipse bolt heating furnaces, blowers, etc. Represented by H. D. Harvey and David R. Steele.
- Morner & Smith, Dayton, Ohio:—Patterns and aluminum snap flasks. Represented by Louis Morner and Charles D. Smith.
- Motch & Merryweather Machinery Company, Cleveland, Pittsburgh, Detroit and Cincinnati:—Representing the Bullard Machine Tool Company, Bridgeport, Conn.; Gould & Erberhardt, Newark, N. J.; Lapointe Machine Tool Company, Hudson, Mass.; Heald Machine Company, Worcester, Mass.; Ransom Mfg. Company, Oshkosh, Wis.; Bullard vertical turret lathe, Gould & Erberhardt shaper, Gould & Erberhardt hobbing machine, Lapointe vertical keyseater, Lapointe broaching machine, Heald American twist drill grinder, Ransom motor driven drill grinder. Represented by E. P. Bullard, F. L. Erberhardt, G. E. Merryweather, E. C. Keener, J. P. Ransom and E. C. Batchelder.
- Mott Sand Blast Mfg. Company, Chicago, Ill.:—Sand blast air compressor and painting apparatus. Represented by David Mayer.
- Mumford Molding Machine Company, Plainfield, N. J.:—Jolt ramming molding machines, high trunnion squeezers, plain squeezers, split pattern machine, pneumatic hand traveling crane. Represented by E. H. Mumford, Carl Falk, E. M. Huggins, F. W. Hamel and A. J. Goss.
- National Core Oil Company, Buffalo, N. Y.:—Cores of samples of various grades of oil. Represented by C. H. Cotton, P. L. Crandall, C. M. Anderson, J. J. McCarty and B. J. Cummins.
- Northern Engineering Works, Detroit, Mich.:—Type E electric crane trolley. Joint exhibit with Cutler-Hammer Mfg. Company, Milwaukee, Wis.
- Norton Company, Worcester, Mass.:—Grinding wheels, Alundum and Crystolon, abrasive materials, India oil stones, Crystolon sharpening stones, Norton Alundum refractories consisting of small electric furnace parts, cores, tubes, muffles, crucibles, combustion boats, filtering dishes, etc., for laboratory use. Represented by George S. Welker and N. C. Hilton.
- S. Obermayer Company, Cincinnati, Ohio:—Branch offices, Chicago, Pittsburgh, St. Louis and Milwaukee. Represented by E. D. Frohmann and S. T. Johnston.
- Oliver Machinery Company, Grand Rapids, Mich.:—Pattern and flask making machinery, universal saw benches, band saws, hand joiners, surface planers, wood lathe, speed lathes, pattern makers' bench, universal tool grinders, disc sander, vertical spindle and disc sander, vertical spindle borer and wood trimmers, Oliver universal wood milling machine. Represented by Joseph W. Oliver, A. N. Spencer, George F. Reinhard, A. S. Kurkjian, Walter Mentzer, Arthur Blake and R. A. Smith.
- Orenstein-Arthur Koppel Company, Pittsburgh, Pa.:—Steel dump car, platform car, turntable, portable track, all narrow gauge. Represented by B. H. Behrens.
- Osborn Manufacturing Company, Cleveland, Ohio:—Plain jolt molding machines, core jarring machines, roll-over rock down molding machines, direct draw roll-over machines, rock-over molding machines, flask stripping machines, stripping plate machines, drop plate squeezing machines, mechanical pattern drawing machines. Represented by H. R. Atwater, F. D. Jacobs, E. T. Doddridge, J. H. Galloway and W. J. Halliday.
- Thomas W. Pangborn Company, New York City, N. Y.:—Sand blasting machinery. Represented by J. C. Pangborn and Harry D. Gates.
- Pawling & Harnischfeger Company, Milwaukee, Wis.:—Single line grab or clam shell bucket in connection with monorail electric hoist, crane controllers, electric hoists and I-beam trolleys. Represented by George L. Mead and F. P. Breck.
- J. W. Paxson Company, Philadelphia, Pa.:—Represented by Howard M. Bougher, W. Scott Thomas, Howard Evans and Ira V. Kremer.
- Pickands, Brown & Co., Chicago, Ill.:—Display of Solvay coke. Represented by B. T. Bacon, E. A. Bateman, G. A. T. Long and J. A. Galligan.
- Pittsburgh Steel Foundry, Pittsburgh, Pa.:—Cast steel open hearth ladle, cast steel charging box, swinging grinder. Represented by E. R. Williams.
- Henry E. Pridmore, Chicago, Ill.:—Stripping plate machines, rock-over drop machines, electrical motor driven jarring machines. Represented by R. E. Turnbull, D. F. Eagan, A. V. Magnuson and Henry A. Pridmore.
- Robinson Automatic Machine Company, Detroit, Mich.:—Automatic machines for all kinds of metal polishing. Represented by C. F. Coda.
- Rockwell Furnace Company, New York City, N. Y.:—Centric pouring crucible furnace. Represented by F. S. Garrett, W. S. Quigley, A. W. Moyer and S. L. Barnes.
- Sand Mixing Machine Company, New York City, N. Y.:—Auto sand mixer. Represented by Wm. A. Hearst, Hutton H. Haley, John Bradley, B. F. Doup and V. E. Minich.
- William Sellers & Company, Inc., Philadelphia, Pa.:—Centrifugal sand mixing machine, belt driven and motor driven, drill grinding machine, motor driven, universal tool grinding and shaping machine. Represented by Edward L. Hollies.
- Shepard Electric Crane & Hoist Company, Montour Falls, N. Y.:—Trolley for three motor electric traveling crane with cage, including the controllers, cage controlled electric traveling hoist and back geared electric motor. Represented by Wm. C. Briggs, Henry M. Hallett, G. H. Wood, Chas. W. Ingalls, Norman F. Farrar, and Wm. A. Battey.
- The W. W. Sly Manufacturing Company, Cleveland, Ohio:—Miniature display of cleaning mills, cinder mill and dust arrester and sand blast equipment and machines. Represented by W. C. Sly, H. J. Norris, G. J. Fanner and H. R. Morse.
- J. D. Smith Foundry Supply Company, Cleveland, Ohio:—Represented by F. A. Coleman.
- Standard Linseed Company, Cleveland, Ohio:—Samples of core oils in large tubular vases. Represented by N. Weisenberg, A. C. Bernstein and H. G. Tremmel.
- Standard Sand & Machine Company, Cleveland, Ohio:—Machinery for treating sands for all kinds of foundry practice. No. 0 and medium size No. 1 or No. 2 mixing, rolling, crushing and blending plant. No. 1 standard batch mixer, steam oil pressure attachment. O batch mixer, one-power adjustable screen, pulverizing disintegrating machine. Represented by H. E. Boughton, J. A. Boughton and E. J. Smith.
- Sterling Wheelbarrow Company, West Allis, Wis.:—Rolled steel foundry flasks. Represented by I. R. Smith and John L. Kirk.
- Frederic B. Stevens, Detroit, Mich.:—Represented by Frederic B. Stevens.
- Tabor Manufacturing Company, Philadelphia, Pa.:—Standard Power squeezing machines, roll-over machines, hand and power, shockless jarring machines, combined jarring and roll-over machines, combined jarring squeezing roll-over machines and Taylor universal tool grinder. Represented by John T. Ramsden, in charge, S. Newbold, C. W. Coleman, J. H. Coleman and C. H. Ellis.
- Tate, Jones & Company, Inc., Pittsburgh, Pa.:—Brass crucible furnace, oil pumping, heating and regulating system, oil burners, portable burner for ladle drying and cupola lighting. Represented by R. G. Kirkwood, J. M. Tate, Jr., C. F. France and J. C. Whitfield.
- Taylor Instrument Companies, Rochester, N. Y.:—Recording pyrometer, radiation pyrometer and other small instruments. Represented by Ralph C. Schwanz.
- United States Graphite Company, Saginaw, Mich.:—Represented by H. C. Woodruff, Frank E. Goddard, Roy A. Corrigan and James G. Drought.
- Wadsworth Core Machine & Equipment Company, Akron, Ohio:—Wadsworth improved core making machines, core ovens, sand mixing and compound mills. Represented by George H. Wadsworth.
- Westinghouse Electric & Mfg. Company, Pittsburgh, Pa.:—Motors and controllers for direct and alternating current and variable speed work. Represented by B. Wiley, F. H. Herzsch, J. H. Klink, E. M. Wise, W. B. Wilkinson and E. B. Townsend.
- Whiting Foundry Equipment Company, Harvey, Ill.:—Standard heavy duty exhaust tumbler with steel plate barrel and lever type door fastener, spur geared crane ladle with standard gear cover, worm geared crane ladle, truck for crane ladle, standard turntable. Represented by G. R. Brandon, C. A. Hardy, A. H. McDougall, R. H. Bourne, T. S. Hammond, J. Hylop, E. E. Prussing, N. S. Lawrence, G. E. Jones, W. B. Lewis and W. Mayor.
- J. B. Wise, Watertown, N. Y.:—M. R. V. brim melting furnaces, tilting type, permanent crucible using coke as fuel. Represented by R. P. Goynne and R. J. Ryan.
- Yale & Towne Mfg. Company, New York City, N. Y.:—Hand and electric hoists with trolley running on I-beam. Represented by H. R. Butler, A. W. Patterson, Jr., and T. J. White.

Electrically Driven Jarring Machine

Important Development in Foundry Machinery
Made by Henry E. Pridmore

A decided departure in jarring machine driving has been made by Henry E. Pridmore, Chicago. How far sweeping in importance is the availability for the foundry of a jarring



Electrically Driven Jarring Machine Built by Henry E. Pridmore, Chicago.

machine which may along with the rest of the machinery be operated by electric motors. *The Iron Age* will not attempt to say, but its promise is very great judging from the reception accorded it in the exhibition booth of the Pridmore firm at the allied foundrymen's convention last week in Pittsburgh. It certainly marks a departure in jarring machine construction, and while it is not possible to give a drawing indicating the method of operation, the following notes and the accompanying halftone engraving

will serve to give a conception of the simple internal arrangements and the reason for the low power requirements.

The machine is set in the usual form of pit for jarring machines. The illustration shows a 3000-lb. machine, which is driven by a $2\frac{1}{2}$ -hp. motor. The motor speed is reduced by means of a worm gear. The driven shaft of the gear carries a cam underneath the table and this has a roller follower forming one end of a bell crank lever pivoted to the inside of the machine frame and attached by pin and links to the under side of the table for lifting it. A friction clutch, the lever handle of which is shown in the cut, allows for the desired convenient starting and stopping of the machine. Large machines are made on the same principle requiring more than one bell crank lever, and it is clear that machines of any desired size can be supplied.

Exhibit of Rogers, Brown & Co.

Rogers, Brown & Co. had an attractive exhibit, consisting of samples of their various pig irons, the main feature of the display being an immense map on which was shown by flashing electric lights the location of their blast furnaces, ten offices and leading coke districts. In front of the space was a pig iron rail fence, with the name Susquehanna Iron cast in each pig. The four posts were surmounted by unusual samples of cokes handled by them, and they also showed samples of imported irons from China, England, Scotland, Sweden and Canada, emphasizing their resources and facilities. The display of charcoal iron in various grades and brands was most complete. The Rosiclare fluorspar, which they are handling exclusively, was shown in various grades. The large oil painting of "The Foundryman" which was shown in their display was further used on the cover of the programme for the vaudeville performance on Thursday evening given by the Foundry & Machine Exhibition in the Auditorium. Representatives present during the convention were H. B. Yergason, in charge; F. W. Bauer, Cincinnati; J. R. Darragh, Thomas A. Wilson, W. P. Cheney, J. R. Morehead, H. S. Philson, Pittsburgh; R. W. Clark, O. Arlt, New York; G. R. Sullivan, H. C. Thomson, Philadelphia; F. E. Fitts, C. A. Wyatt, Boston; G. M. Butler, Chicago; Sterling Hubbard, Cleveland, and W. G. Ireland.



Electrically Lighted Map of Ore and Coke Properties of Rogers, Brown & Co.

Gas Cavities and Shot in Iron Castings

An Investigation of Defects Causing Hard Spots and Blowholes—Nearly All Traceable to the Mold

In an interesting paper presented at the Pittsburgh convention of the American Foundrymen's Association May 26, Thomas D. West presented some of the results of his investigations into the causes of gas cavities, shot and chilled iron in castings. Some months ago Mr. West solicited from the foundrymen in the United States samples of iron castings showing globules in gas cavities solidly encased shot iron, hard streaks or spots, and white areas inside of gray or soft iron. Those sending samples were asked to give details of mixtures, with analysis of the casting and the defects; also data concerning the method of molding and the condition of metal at pouring.

Responses were received from a number of foundrymen, and in the early part of the paper the writer refers to a letter from a Massachusetts firm and one from a large foundry in New Jersey. The first-named firm had thought that the trouble with shot iron was due to chilled or hard bits of metal going into the cupola and not being properly melted. However, it was found that by putting particles of "shot" in the ladles and pouring castings from them there were no bad results. The hard materials were also put in the mold and the iron poured in on top of them, but with the same result—no shot. Other deliberate attempts to produce shot were unsuccessful, and Mr. West's correspondent was still in the dark as to the cause of the defects. In the New Jersey case it was thought that some of the hard iron stars used for cleaning got mixed with sprues and scrap, but this proved incorrect. The author says that the two experiences set

unless they rose to be embedded in the middle portion of the casting.

The author considers that shot may be formed by the metal from the ladle striking the sides of a pouring basin or a gate. Also by falling on a flat bottom inlet gate, as at E, Fig. 2. It is best that all pouring gates have more or less of a well, as at H, Fig. 2, so that the first tapings from the ladle may not be spattered and create shot. From the instant the falling metal strikes the bottom of a gate there should be a steady and unbroken stream rapidly filling the pouring gate. Dampness due

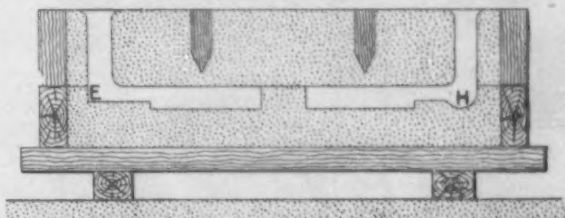


Fig. 2.—Flat Bottom Gate and Gate with Well.

to the free use of a swab or to set sand may also create shot which will be carried into other sections of the mold.

An illustration of globules in gas cavities and blowholes is given in Fig. 3. These the author attributes to the creation of gas or steam which cannot be liberated. Excessive gas may come directly from the metal or wholly from defects in cooling or pouring. There may also be improperly tempered sand, too hard ramming, improper venting and bad cores.

Globules when suspended from the roof of a cavity as at B, Fig. 3, may be considered evidences of defective making, gating or pouring of the mold. The form of adhesion is due to the upper body of the mold being more fluid than the lower. Gas cavities may be due to causes inherent in both the mold and the metal. The bubbling or boiling of the mold might throw off small buttons of metal that would fall back oxidized into rising metal in the mold, and these buttons or shot by reason of their oxidation and the gathering of dross could create a gas, producing companion cavities to those due to the steam or confined gases of the mold trying to escape, but being imprisoned in the metal, as in Fig. 4. The author in more than 40 years' experience as a molder and shop manager has found little ground for believing that sulphur or phosphorus form blowholes in gray iron castings. He had always found that changes in the method of molding

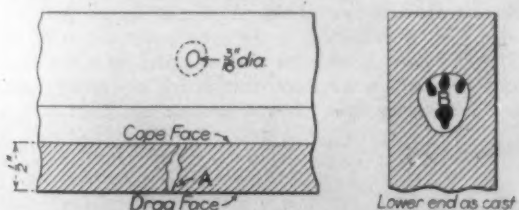


Fig. 1.—Embedded Shot Which Caused a Blowhole.

Fig. 3.—Globules on Roof of Cavity.

aside the belief held by many that chilled or hard particles going into the cupola produce shot, streaks or spots in castings.

Embedded Shot Giving Off Gas

About as interesting a sample as Mr. West received was one which had a small button or shot loosely embedded within the drag face of its surface. Fig. 1 shows the crease made by the tool in being turned to one side when it struck the hard spot; also indentations made by removing the hard shot from the planed face of the casting. A small blow-hole led directly from the top of the shot shown at A to the cope face. It was evident that the shot gave off a gas that escaped from the molten metal to the sand surface of the cope, but not fast enough to prevent the creation of a blowhole. The shot was not large enough to permit of the complete analysis that would no doubt have thrown light on the problem.

Several samples of soft iron castings were received containing solidly encased small bodies of strictly white iron. These were very closely united with the gray iron. Some shot iron was received which had been taken from a cupola spout after the bottom was tapped. Some of it was placed in the bottom of an open sand mold in which castings about $\frac{3}{8}$ inch thick were made. The shot were placed on the bottom face of the mold at the end farthest from the pouring gate. An examination of the casting showed the shot in their original position and not united to the body of the casting. Mr. West concludes that unless the shot are up to a very high red heat, or near the fusing point (as is possible in many cases when they are formed in pouring a mold), casting metal under $\frac{3}{8}$ in. thick would have little effect in melting them,

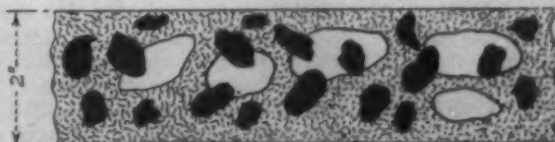
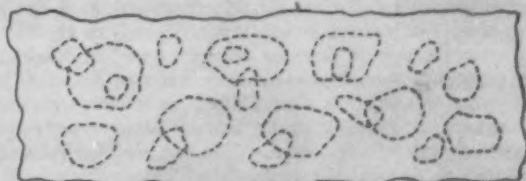


Fig. 4.—Defects in Retort Casting.

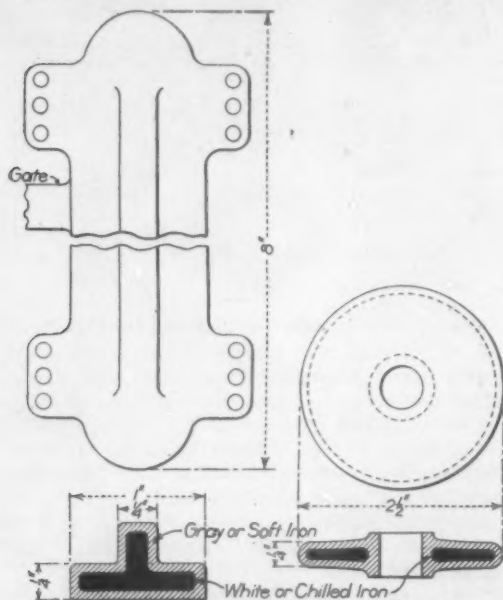
stopped blowholes in gray iron work. With chilling iron, sulphur and phosphorus might cause blowholes.

Experiences in British Foundries

Several pages of the paper are devoted to quotations from a letter the author had received from P. Munnoch, of the British Foundrymen's Association. Mr. Munnoch's first experience was with gray shot inclosed in small castings. Analysis showed that some of these were splashes of metal at the beginning of pouring, while others were

enclosures in the interior of the casting after the greater part of the metal had solidified. The analysis of the latter appeared similar to that of metal drops squeezed out of phosphoric pig iron after the metal had solidified. J. E. Stead was of opinion that blowholes were first formed and these afterwards became filled with the highly phosphoric liquate.

Some large cylinder heads for blowing engines supplied Mr. Munnoch with interesting specimens, pieces several ounces in weight being obtained. In some cases small shot were partly enclosed by larger masses, and these, together with the difference in composition, showed that the metal had not all entered the cavity at the same time, but at different periods of solidification. Generally the formation of shot holes and shot is most noticed in iron subjected to oxidizing conditions during melting.



Figs. 5 and 6.—Castings Which Showed Inside Chill.

Mr. Munnoch cited the case of the first metal from the cupola running cold, particularly when softer varieties of iron are being melted. If this is caught in a ladle and allowed to solidify it often presents the appearance of a spongy mass full of shot, the holes and shot being coated with oxide and graphite. Should some of these be left in the bottom of the ladle and hot iron be poured over them a boiling action follows, and if the iron is poured into a mold the castings will contain many shot holes.

Character of Metal Not Responsible

Mr. West considers that the causes of the buttons, shot and blowholes cited by Mr. Munnoch lay in the mold, and that the character of the metal used had practically nothing to do with producing them. Referring to the large specimens of shot Mr. Munnoch obtained, the author suggests that blowing molds could produce them. Metal is often blown out three or four feet, and in coming down large globules or buttons can be formed, he says, by bits of iron lodging on flat planes, projecting portions or flanges of the mold, or by falling back directly into the bath of dull rising metal. The buttons would naturally create gas cavities. Two kinds of gas cavities were to be distinguished in the cases Mr. Munnoch reported—those formed by the gas created by embedded shot and those due to the gases of the mold or cores. One unexplained feature was the difference in chemical composition of two buttons Mr. Munnoch found in the same cavity.

From Cincinnati the author received a report on a large retort casting which had been rejected because of many cavities, with large buttons mixed with dross in the cope section. The sample is shown in Fig. 4. The defects in this case Mr. West considered to be due to bad gating. The metal rushing into the mold cut into some green sand fronting the gate and on directly striking the face of the mold would spatter. Particles fell back in partly solidified bodies, some of which lodged on the top of the slag caused by the cutting action. On rising these buttons were imprisoned against a horizontal plane and held there by solidification of the metal.

A New York State foundry superintendent reported a case of bad castings due, as he believed, to shot formed

by the air in the mold. The metal was carried some distance before pouring and was not hot enough to remelt the shot.

The author does not wish to convey the idea that there can be no defects due to gases emanating directly from some irons, as suggested by Mr. Munnoch, but he believes oxidation in melting is preventable, just as are improper methods of molding. If metal which is seen to be dangerously loaded with oxide of iron as it comes from the cupola has to be used, it should only go into the roughest castings.

"Inside Chill"

The concluding portion of the paper is devoted to two cases of "inside chill," or white iron inside of gray or soft iron, reported by Walter H. Wiard, chemist for a large foundry firm in Illinois. Such cases are very rare. In Figs. 5 and 6 are shown sections of the two castings reported on by Mr. Wiard. The inside chill extended throughout the entire casting and the demarcation from the soft iron was very sharp and distinct. The explanation, in Mr. West's opinion, is not to be found in the mixture used, nor in the method of melting, and he believes experiments in actually producing such results at will are necessary in order to clear up the cause, which thus far is hidden. He solicits further comment on the subject.

Core Bench Jolt Rammer

Generally jolt ramming machines are associated with very large and deep molds, although their advantages in core shops are beginning to be appreciated. It has well been known that jolt ramming of large cores, even when filled with rods, coke centers, etc., is economical and for deep cores of small dimensions made on the bench, the ramming, including the bedding in of reinforcing rods or wires, can be better and more cheaply done on a small jolt ramming machine. The Mumford Molding Machine Company, Plainfield, N. J., has recently developed a machine of this type which can be placed on a concrete pier, iron or wooden post or mounted on the core bench.

The machine is started and stopped by a knee valve under the bench, an arrangement which leaves the operator with both hands free to manipulate material and core



The New 3-In Core Bench Jolt Rammer Built by the Mumford Molding Machine Company, Plainfield, N. J.

boxes. The valve is constructed to all intents and purposes the same as a valveless plunger and is merely a plug of case-hardened machinery steel having a vertical stroke of 3/16 in. Although this construction is very simple, at the same time it is claimed that the economy in air secured by its use is greater than that of the more elaborate valve mechanisms used on this type of machine.

The size of the table is 15 x 20 in. and the diameter of the plunger is 3-in. Although the rated capacity of the machine is 300 lb. with an 80-lb. air pressure, the advantages when used on small cores where the core boxes, sand and reinforcing material weigh only a few pounds are said to be very great. The complete shipping weight of the machine is 325 lb.

A Swinging Frame Grinding Machine

In steel and malleable iron foundries and crucible steel plants a grinding machine with a swinging frame can be extensively used for grinding fins and pads from castings and also for grinding the finished surfaces of parts such as draw-bars, knuckles, oil boxes and hammer dies. On account of the demand for a machine of this type, the Pittsburgh Emery Wheel Company, Pittsburgh, Pa., has brought out a line of grinders which are not only thoroughly practical and capable of meeting the requirements

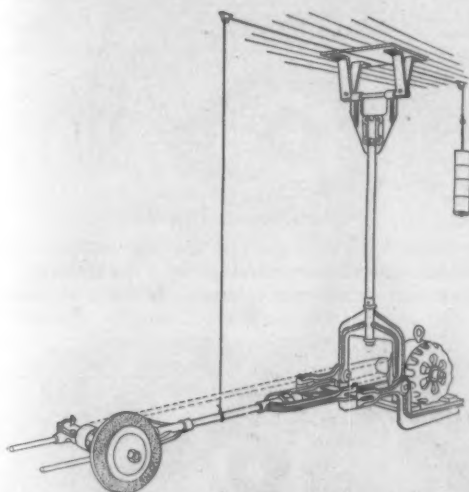


Fig. 1.—A Motor-Driven Swing Frame Emery Wheel Grinder Built by the Pittsburgh Emery Wheel Company, Pittsburgh, Pa.

of the varying conditions, but also embody in their construction some novel features. Two types of machines are built, one for motor drive as illustrated in Fig. 1, and the other for a belt drive from a line shaft as shown in Fig. 2.

A horizontal bar in the top hanger on which the top yoke is mounted provides means for lateral adjustment to keep the belt and the pulleys in alignment and the vertical pipe is threaded and has a nut which controls the tension of the belt. Both of these features, which are covered by patents, are also embodied in the rear horizontal yoke and their use at these two points is said to result in a saving of from 2 to 2½ h.p. in the operation of the machine. The wheel head yoke has a bearing 7 in. long

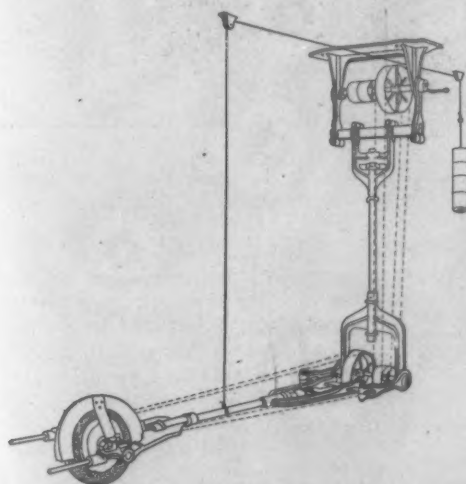


Fig. 2.—The Belt-Driven Center Wheel Type With Hood.

and 2½ in. in diameter and furnished with grease cups.

In the motor-driven machine where the motor is mounted on the bracket at the elbow, as illustrated in Fig. 1, the extreme length of the armature shaft of the driving motor must not exceed 26½ in. This condition is easily met as all the standard types of alternating and direct current motors of the power required, which is 5 to 7½ hp., are made with frames that do not exceed this dimension. The top yoke in the belt-driven machine shown

in Fig. 2 is suspended from a hood cast in the hanger bracket, an arrangement which throws the weight of the entire machine on this bracket instead of on the shaft upon which the pulleys are mounted. This shaft is journaled in bronze bushings in the hanger bracket and the bearing at this point has ample facilities for lubrication.

These machines are built to accommodate wheels having diameters of 13, 20 and 24 in. and face widths of 2 and 2½ in. in all three sizes, while in the 24-in. size there is an additional width of 2¼ in. These machines can be furnished for carrying the wheels with safety steel collars either between the bearings or on the outside of the yoke and all types can be supplied either with or without hoods. Where the hood is used on the machine and the wheel is in the center, the rear end of the hood is attached to a hinge on the yoke while its slides are fastened to the top of the bearing cap. In this way, when it becomes necessary to change either the wheel or the safety collars it is only necessary to remove the bolts in the bearing cap and swing the hood back on its hinge.

Steel Making Pig Iron in 1910

The American Iron and Steel Association publishes the following details of the United States production of steel making pig iron in 1910:

Bessemer and Low Phosphorus

Of the total production of Bessemer and low phosphorus pig iron in Pennsylvania in 1910 the Lehigh and Schuylkill valleys made 164,976 tons, against 142,547 tons in 1909; the Lower Susquehanna Valley made 126,463 tons, against 119,874 tons in 1909; Allegheny County made 2,352,149 tons, against 2,143,009 tons in 1909; the Shenango Valley and the remainder of the state made 1,750,317 tons, against 1,446,176 tons in 1909; total, 4,393,905 tons in Pennsylvania in 1910, against 3,851,606 tons in 1909, a gain of 542,299 tons.

In Ohio the Mahoning Valley produced 1,738,907 tons of Bessemer and low phosphorus pig iron in 1910, against 1,682,839 tons in 1909; the Lake counties, 830,921 tons, against 1,051,329 tons in 1909, and the Hanging Rock bituminous district and other parts of Ohio, 890,908 tons, against 893,878 tons in 1909; total in Ohio in 1910, 3,460,736 tons, against 3,628,046 tons in 1909, a loss of 167,310 tons.

Fourteen states made either Bessemer or low phosphorus pig iron in 1910, against twelve states in 1909 and the same number in 1908.

Basic

The production of basic pig iron in Pennsylvania by districts in 1910 as compared with 1909 was as follows: The Lehigh Valley, 366,132 tons, against 297,007 tons in 1909; Schuylkill and Lower Susquehanna valleys, 754,290 tons, against 606,447 tons in 1909; Allegheny County, 2,807,551 tons, against 3,187,687 tons in 1909; Shenango Valley, 620,658 tons, against 553,206 tons in 1909, and the remainder of the state, 698,434 tons, against 611,898 tons in 1909; total, 5,247,065 tons, against 5,256,245 tons in 1909, a loss of 9180 tons. In Ohio the Mahoning Valley and the Lake counties made 690,941 tons in 1910, against 460,552 tons in 1909, and the Hanging Rock miscellaneous bituminous district made 464,493 tons in 1910, against 385,404 tons in 1909; total, 1,155,434 tons in 1910, against 845,956 tons in 1909, a gain of 309,478 tons.

In 1910 basic pig iron was made by 68 plants in 10 states, as follows: Pennsylvania, 32 plants; Ohio, 15; New York, 5; Virginia, 4; Alabama, 4; New Jersey, 2; Indiana, 2; Illinois, 2; Missouri, 1, and Colorado, 1.

There was a decrease in the production of basic pig iron in 1910 as compared with 1909 in New York, New Jersey, Pennsylvania, Virginia, Missouri and Colorado. The falling off in Allegheny County, Pennsylvania, was especially heavy and amounted to over 380,000 tons. Alabama, Ohio, Indiana and Illinois increased their production of basic pig iron in 1910 as compared with 1909, the increase in Ohio alone amounting to over 309,000 tons.

Railroad Equipment Ordered.—Orders placed by railroads include: Northern Pacific, 500 25-ton freight cars; Missouri, Kansas & Texas, 108 miscellaneous freight cars; Duluth, Winnipeg & Pacific, 500 freight cars; Chicago, Burlington & Quincy, 1000 gondola and 500 refrigerator cars.

Four New Foundry Machines

Recent Products of the Osborn Mfg. Company

Important additions to its line of foundry equipment have been recently made by the Osborn Mfg. Company, Cleveland, Ohio. These consist of four new machines, a roll-over rock-down molding machine, a portable pattern drawing device, a drop plate squeezer and a no-lift jarring machine. The successive stages in the operation of the first are shown in Figs. 1 to 6 inclusive. Figs. 7, 8 and 9 illustrate the use of the pattern drawing device while views of the drop plate squeezer and the no-lift jarring machine are given in Figs. 10 and 11 respectively.

The Roll-Over Molding Machine

This machine, a general view of which is given in Fig. 1, possesses a number of new features and is designed for convenience in operation and to reduce the labor cost to a minimum. The pattern plate is mounted on a swinging table and the flask is placed thereon and rammed in the same way as in an ordinary molding machine as shown in Fig. 2. After the bottom board is placed on and clamped

the floor, a true pattern draw is assured without the aid of any leveling device. An important feature is that the pattern is drawn from the mold before the clamps are removed from the flask.

After the mold, a view of which is given in Fig. 6, has been rolled over on its trunnions it is held in position by an automatic locking device while it is being lowered to the floor. The pattern drawing frame has an opening in the center for making deep green sand cores.

The machine is made in three sizes, each having a pattern draw of 10 in., for handling flasks measuring from 26 x 30 in. to 30 x 48 in., with a depth of 6 to 15 in. The sizes given are for iron flasks, which are slightly larger than the wooden ones used.

Pattern Drawing Devices

The Osborn portable pattern drawing machine has been designed to be used in connection with the drawing of patterns on large, heavy work, especially such as is rammed

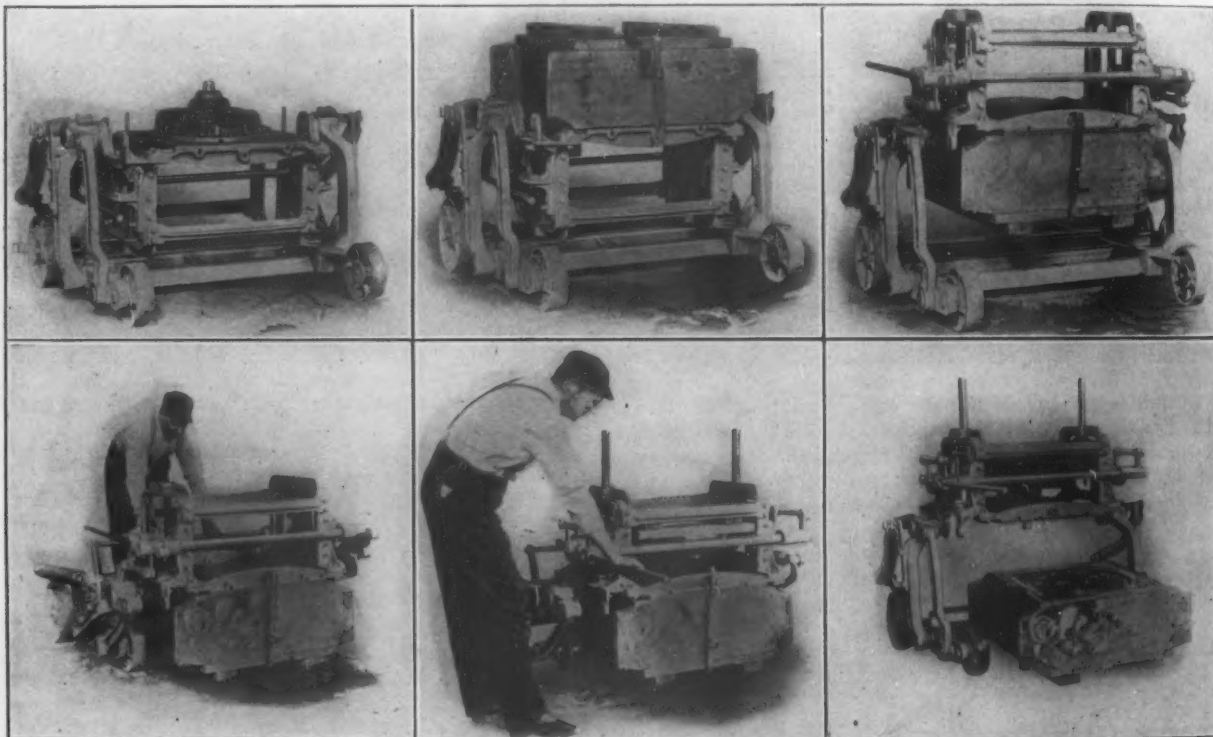


Fig. 1.—The Machine Ready for Ramming.

Fig. 4.—Rocking the Flask to the Floor.

Fig. 2.—The Flask Rammed.

Fig. 5.—Drawing the Pattern.

Fig. 3.—The Flask Rolled Over.

Fig. 6.—The Finished Mold.

Successive Stages in the Operation of a New Roll-Over, Rock-Down Molding Machine Built by the Osborn Mfg. Company, Cleveland, Ohio

in position the mold is rolled over easily by one man. A view of the machine with the flask rolled over is given in Fig. 3. The mold is hung in such a way in the machine that it is slightly top heavy when the flask is filled and the board clamped in position, an arrangement which lessens the labor of the operator in rolling it over.

The ramming position of the flask is low, which reduces the labor of shoveling the sand and makes the ramming operation easier. The machine is mounted on large wheels having roller bearings, so that it is easy to move it to follow the sand heap or to any other part of the foundry floor. All of the work can be done from one side of the machine, so that the operator can fill and ram the mold, roll it over, rock it down and draw the pattern without any lost motion. It is also so designed that an operator can handle large molds of considerable weight quite easily.

After the mold is rolled over it is rocked down to the floor, this operation being illustrated in Fig. 4, and is placed in the proper pouring position by the machine, a feature which applies to both parts of the mold. The drag requires no handling after being released from the machine. As the pattern is drawn, as shown in Fig. 5, from any position at which the flask rests when it is set down on

on jolt machines. This device makes it possible to draw the mold on the floor where it is to be poured and to secure a smooth even draw whether the flask rests level on the floor or not. A great saving is claimed by securing this accurate draw, the advantages being that it eliminates sticking in the mold, lessens wear on patterns, saves patching of the molds and chipping work on the costing.

The pattern drawing device consists of a frame which sets over the pattern plate and is supported on four posts resting on the rim of the flask. Figs. 7, 8 and 9 show the pattern attached to half of an iron flask, but ordinarily the pattern is attached to a plain plate or match board. The match board is placed in the jolt ramming machine, the flask set upon it and the sand shoveled in and rammed in the usual manner. The sand is then struck off, the bottom board clamped on and the flask rolled over by a roll-over tackle or rigging and swung to the floor. In large work the crane then raises the pattern drawing device and sets it over the pattern plate on the edge of the flask, the four pins passing through the notches in the edge of the plate. A view of the device being lowered is given in Fig. 7.

A set of short cranks are connected to the pattern plate by links and are operated by long levers. In Fig. 8 these

levers are thrown so that they cross each other, the device being set on the mold preparatory to drawing the pattern. In Fig. 9 the levers are thrown out, drawing the links into their uppermost position and raising the pattern plate from the face of the flask. When the pattern is drawn the crane raises the whole device from the mold, the pattern plate is released and returned to the molding machine.

The device is made in five sizes, ranging from 18 in. square to 42 x 72 in. with maximum pattern draw of 6, 8, 10, 12 and 15 in. for the various sizes. In the case illustrated the flask and pattern weighed 1200 lb., but they were easily drawn by two men with this machine without the aid of a crane or hoist.

In addition the company makes a pattern drawing device of a similar type but lighter in construction for drawing work on light molds which is not shown. This machine is light enough to be moved easily by hand and is set over the mold by the workman. He then draws the pattern with less effort than would be necessary if he had to lift it bodily. This is made in a number of sizes with a pattern draw of from 6 to 16 in.

The Drop-plate Squeezer

Fig. 10 illustrates an earlier style of the Osborn drop-plate squeezer, which can also be used as an adjustable flask stripping machine. Its construction is strong, simple and rigid. The squeezer is operated with a powerful lever. The chain connection to the squeezer head shown has been replaced in the newest type by a spring, which throws the head back after the operation. It is claimed that it can handle larger and more difficult work than the

in. in width and having a maximum length of 18 in. and a maximum pattern draw of 6 in.

No-Lift Jarring Machine

The Osborn no-lift jarring machine shown in Fig. 11 is especially designed for use in the core room or on upper

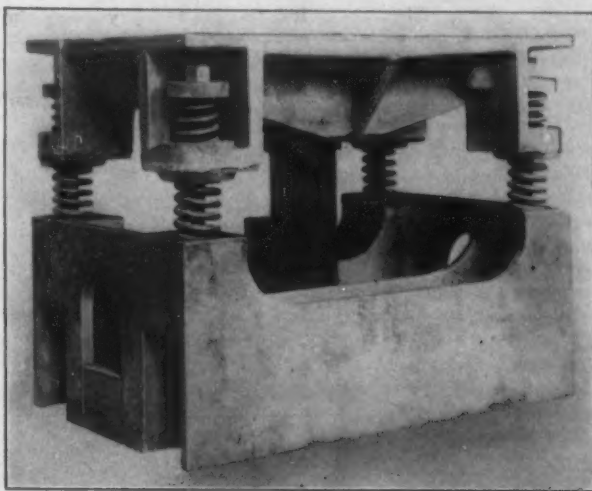


Fig. 11.—The Osborn No-Lift Jarring Machine.

floors. No foundation is required for the machine and as the blow is upward it is claimed that there is no shock to



Fig. 7.—Lowering the Flask on the Pattern. Fig. 8.—Ready to Draw the Pattern. Fig. 9.—The Pattern Drawn From the Mold. The New Osborn Pattern Drawing Machine in Use.

ordinary squeezer type machine. As an adjustable flask stripper it is similar in construction to the maker's ad-



Fig. 10.—Drawing the Pattern with the Osborn Drop Plate Squeezer Molding Machine.

justable flask stripping machine, which was illustrated in *The Iron Age* March 3, 1910, and takes flasks from 9 to 12

the floor, the force being entirely absorbed in packing the sand. The machine consists of an ordinary molding machine table beneath which is a cylinder in which works a plugger or piston, which strikes a blow on the under side of the table. The table is supported on springs and is ribbed so that the force of the blow is distributed to all parts of the mold and draws the sand down uniformly to the pattern or into the core box. The machine requires only a 3/4-in. inlet for air and has a 4-in. cylinder and a specially designed self-contained valve. The table has a working surface of 24 x 36 in., and the machine will jar molds up to 1000 lb. in weight.

The Milwaukee Car Plant Transferred.—At a recent meeting of the stockholders of the Milwaukee Refrigerator Transit Company, Milwaukee, Wis., its capital stock was increased from \$150,000 to \$400,000 and its name changed to the Milwaukee Transit & Car Company. The change in name was for the purpose of absorbing the Milwaukee Car Mfg. Company, whose plant and properties of all kinds were taken over by the former company on April 25. The new company assumed all contracts, liabilities, etc., of both the former companies. The transaction gives the new company a first-class car shop, fully equipped for the building of new cars and the repairing of old ones. A number of improvements are contemplated, but will in all probability be held up until such time as the situation with the railroads becomes a little more encouraging. The company will manufacture and repair cars for both its own and other companies. The following equipment has been purchased and is now being installed: One 230-h.p. Sterling boiler, one 95-lb. Berlin planer and matcher, one Fay & Egan car tenoning machine, one Bentel & Margedant railway cut-off saw and one Ferguson bolt furnace.

Briquetting Metal Borings*

Compressing Metallic Waste Under Pressure, Without Binding Material, Into Substantially Solid Shapes Ready for Melting

BY DR. RICHARD MOLDENKE, WATCHUNG, N. J.

One of the latest developments in the metal industry in connection with the utilization of metallic waste is the process of briquetting it under enormous pressure, without the use of a binding medium. The process was originated by Arpad Ronay, of Buda Pesth, who conceived the idea of imitating nature as closely as possible in the production of rock deposits. That is to say, he combined extreme pressure with a sufficiency of time to allow individual particles to get close together, excluding thereby spaces filled with air or water, which under pressure would tend to weaken the bond. This is exactly what happens in nature in the formation of deposits, the very fine particles of disintegrated minerals settling down slowly and into close contact, to be later on compressed into stone by the weight of superposed layers.

Success of the Process

When metal particles, as well as ores or other fine materials, are subjected to the ordinary rapid and heavy pressures enough air is entrained to give trouble when the briquettes are heated up. The air expands, causing the breaking up of the briquette with consequent excessive loss and troubles incident to the use of the fine material untreated. Ronay's results were surprising in that the briquettes were perfectly inert so far as their integrity was concerned, and the ores were reduced like regular lump ore, and metal briquettes melted like pig iron. It is this treatment that forms the basis of the patent protection.

When the writer was first asked to investigate the process professionally at the instance of American interests, before going to Europe to do so, he took one of the German briquette made of cast borings, and melted it in his cupola, leaving the breast open so that by means of an iron bar contact could be had with the briquette from time to time, as it melted. It was found that the lump of briquetted borings melted just as a piece of pig iron would, holding its shape until the final softening and dropping to the bottom.

A visit to the several briquetting installations in Europe existing at the time showed the briquetting industry to be in a flourishing condition, and since that time more plants have been added, making ten in number at this writing. There are two in Berlin, one each in Chemnitz, Stolberg, Cassel and one at the Imperial Navy Yard at Kiel. Then there are plants in Vienna, Buda Besth, Milan and at Winterthuer, Switzerland. In this country the Ronay process for handling metal waste is operated by the Metal Briquetting Company, New York City.

The Method of Briquetting

In general the process may be described as follows: Cast iron, steel, brass, bronze, aluminum, copper chips, borings, filings and metallic slimes after drying, and for that matter sawdust, coal graphite, salt, ore, flue dust, &c., go to a hopper above the press proper. In the case of borings, it is first necessary to allow these to pass by an exhaust fan, to remove dust and dirt (also taking the very fine graphite away.) Incidentally where there has been some slight rusting of the borings, the rubbing of the particles upon each other during transit, loosens the rust and this is drawn away by the exhaust, thereby greatly improving the quality of the briquette, as rust is never a good thing to go into the cupola.

Steel turnings pass through a set of disintegrating rolls to reduce bulk. After cleaning the borings by exhausting the dirt and sweepings, they pass over an electromagnetic separator to remove brass from iron. The cleaned and separated borings then pass into the feed hopper of the press.

The borings flow by gravity into the hopper of the press, then into the die, and as the plunger descends receive their first compression. The air passes out as the borings go together, the separate particles curl into each other, and the partially completed briquette, in the die, passes on carried by the revolving press table to the next stop where plungers below and above apply pressure up to 35,000 lb. per square inch. The die containing the briquette is free to move up or down at this point, giving the compressed material within freedom to adjust itself to an evenly distributed force.

On the withdrawal of the plungers, the revolving table makes another movement, placing the die with the finished briquette within (slightly conical in shape) under another plunger, which forces the briquette out and upon a band to take it away from the machine. All these movements are entirely automatic, the valve regulation being perfect, one man looking after the operation of the press itself, another taking the briquettes away, while a third sees that the hoppers are properly fed from borings received at the plant. A foreman machinist looks after the general operations, the pumps, accumulator and intensifying units.

It may be interesting to state that the briquettes after leaving the press become quite hot, so that any oil originally in the borings, and that applied to the die before filling either by a swab in hands of the man at the press or automatically, does some smoking. Moisture present also disappears in a short while, the heat, however, not being sufficient to prevent the hand from resting on the briquettes for a moment.

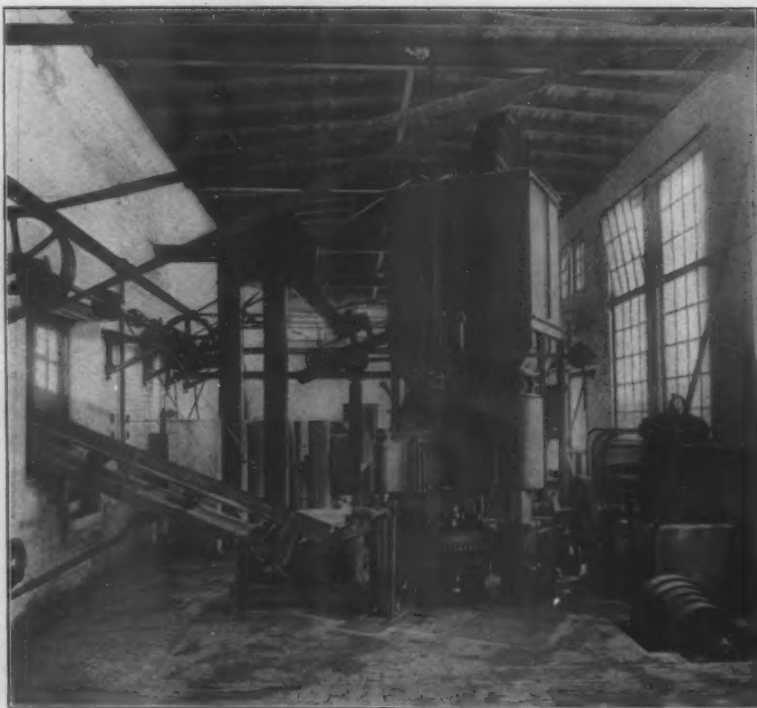


Fig. 1.—Interior of the Chemnitz Briquetting Plant.

*From a paper read before the American Foundrymen's Association, Pittsburg, May 23.

One press with a capacity of $1\frac{1}{4}$ tons an hour, and hence one of the small sizes, has been running regularly for several years, and beyond the renewal of the cast iron dies every three months or so has required no repairs. An intensifier is employed to bring the water pressure of the very heavy pumps up to that of some 35,000 lb. per square inch, as required for the work in hand. The larger cylinder of the intensifier is below the floor line. Two pumps develop the necessary primary pressures. An accumulator serves to insure even working and rapid action.

Cast iron briquettes $6\frac{1}{4}$ in. in diameter and 7 in. high, weighing 38 lb. each, are formed. Fig. 2 shows a pile of wrought iron chip briquettes, of a shape no longer used. The round briquettes—the present form—are seen at the right.

The Chemnitz plant has been removed into a new building. It has bins extending outside through the building wall for unloading shipments of borings separately, so that the product of a works may not be mixed together with that of another establishment. A loading conveyer carries the briquettes from the press automatically on cars, without any handling whatever. Fig. 1 shows the interior of the plant with one of the new large presses installed—the old one from the other plant not having been placed at the time the picture was taken, being too busy to move until the new press cared for its daily burden. This new press is of 6 tons per hour capacity and automatic in every particular, thus reducing the cost of briquetting—including overhead charges, interest, labor and all—exclusive of royalty, however—to about 50 cents a ton. The cost of such a large press, with conveying apparatus and all accessories, is about \$325,000, which shows to what perfection the process has been brought in Europe in the short time the matter has been before the iron industry.

Fig. 3 shows two molds and one plunger end belonging to a 5 ton per hour press.

The perfecting of these presses has cost probably \$200,000 and the unremitting attention of several years. The cast borings briquettes are so uniform in weight that counting them while charging is sufficient for all purposes. They can be handled just like pig iron. In fact they have been piled twice as high, transported everywhere in open or covered cars, without any damage whatever, and when charged into the cupola melt without disintegrating.

A briquette of wrought iron borings has been heated up and put under the hammer, turning out a very serviceable drop forging.

Use of Borings in the Cupola

The use of borings in the cupola is an affair probably as old as the cupola itself. Until very recent times, however, but little of value has resulted in this direction. Whitney and Outerbridge were the first to give results to the public, and in the days of high priced iron boxing up the borings in wooden containers answered fairly well. Then again, in the anthracite region it was a common thing to use old powder cans, nearly filled up with borings, the tops beated down and the canisters charged into the cupola. Latterly an adaptation of this with the novel feature of continuous tubes filled with the borings has met with considerable success when carefully handled. All these methods, however, may be described as "fussy" even if effective, one works using all the old cans that could be obtained until the supply gave out. With the briquetting method, however, which, aside from the royalty question, is the cheapest of them all, a new era was commenced, for the melting loss was reduced to a minimum, no apparatus was needed after the material left the press room, and the ordinary conduct of the foundry was in no way disturbed.

On the question of cupola practice, therefore, the use of briquettes simply parallels the use of pig iron and heavy scrap, and inasmuch as the briquettes, in spite of the enormous pressure, are not fully as solid as pig iron, they melt somewhat easier and faster than it, and from their handy shape and weight form an ideal cupola charging and melting material.

Whereas borings when charged directly into the cupola lose all the way up to 50 per cent. of their weight, besides ruining the product; when they are boxed, canned or melted in tubes the melting loss is not excessive, varying between 8 and 12 per cent., the danger always remaining that the cans or tubes will open and by discharging the loose borings over the coke bed ruin everything that follows until they are burned or melted and washed out.

In the case of briquettes, as in every other melting

tests made to get figures on a process, much depends upon how the melting is done. For instance, in melting straight pig iron with small precautions to get the very best melting practice, the melting loss may amount to 3 per cent. and even over. Where, however, these precautions are taken repeated tests have made this loss about 1 per cent., and in the case of sandless pig as low as 0.3 per cent.—some carbon having probably been taken up during the melt. Hence also in the case of running straight heats of briquettes the melting loss with practice that gave 2.5 to 3 per cent. loss for straight pig iron gave 8 to 10 per cent. for the briquette loss. With careful practice, however, there is no difficulty in getting this down to 6 per cent.

As, however, no one would think of running a straight heat of briquettes for daily practice, but charge all the way from 10 to 80 per cent. of these articles, the rest being pig iron and scrap, the melting loss of the heat will be about the normal one. In the case of a heat made with 80 per cent. briquettes and 20 per cent. pig iron, the actual melting loss was only 3.5 per cent, showing either more careful practice or else that the comparatively heavy pig iron held the temperatures in the cupola more sharply localized, doing the melting where wanted without oxidizing what was above.

There are some metallurgical changes in melting borings, whether loose or briquetted, which must be reckoned with. In melting a material which has such an enormous surface for a given weight and which even when com-



Fig. 2.—Wrought-Iron Chip Briquettes As Made By Metal Briquetting Company, New York City.

pressed practically solid to remove the disadvantages of the disproportion in question can still be permeated by gases to some extent when expanded by heat certain changes necessarily take place. The silicon will be lowered considerably more than is the case ordinarily; similarly the total carbon, while the sulphur taken up is about double the ordinary increase. This, of course, is particularly noticeable only when an entire heat of briquettes is to be reckoned with. Under ordinary conditions with part briquettes only there is little difference noticeable, and for such work as cylinders of gas and steam engines, ammonia castings and the like, there is a marked improvement on

the part of the castings produced. This may be understood more readily by remembering the fact that a reduction in the total carbon and silicon corresponds to a steel addition to the charge. The slight increase in sulphur means a structure more finely granular, and hence a better wearing surface for cylinder work.

Inasmuch as the large locomotive works of the Continent are adopting the use of briquettes, and when proper melting practice prevails, the castings made are perfectly sound and free from blow and pin holes, it is evident that the use of borings in the way described is not a detriment. In fact, strange as it may seem, in Germany these briquettes are actually sold at pig iron prices, and at the Borsig works, for instance, the regular charges for steam and gas engine cylinders, and other engine parts; refrigerating machinery (ammonia and sulphurous acid); hydraulic machinery and air compressors; superheated steam and steam turbine apparatus; contain 40 per cent. of briquettes.

Perhaps one of the most interesting applications of the briquetting process lies in the ability to mix steel with cast borings. Here is a most excellent way of charging steel into the cupola without burning up a portion of it before melting. The contact of a low carbon with a high carbon material means the melting down of this combination with an average carbon content. In place, therefore, of adding 40 per cent. steel scrap to the charge and in melting get perhaps a reduction in carbon in the castings corresponding to half of this as a result, either much less steel need be added to the borings for briquetting, or if the full amount is added, a much stronger metal is obtained. A founder can therefore not only utilize any steel scrap he may produce efficiently, but actually order or make his briquettes with just the proportion of scrap he wants in them.



Fig. 3.—Molds and Plunger Used in the Ronay Process.

In the case of all steel briquettes it may be said that for air or open hearth furnace work these excel the regular heavy steel scrap in point of working. No only do they melt faster, thereby shortening the heat considerably, but from the uniform size and shape they pile nicely in the furnace, allowing a better circulation of the gases to melt them than can ever be obtained by irregular and large scrap pieces.

The briquetting of brass, bronze, aluminum, white metal and other metals has not been touched upon, but it may be said that with these the melting losses are the same as the solid metal when melted, for in the case of all the softer metals and alloys they are pressed together so closely that they are for all practical purposes sound pieces of metal. The finer the scrap the better the briquette, and hence a magnificent field has been opened for the economical recovery of the expensive metals in the foundry.

The near future will see a rapid development of the art in this country, and it is expected that other metallurgical reactions, such as de-sulphurization of iron, recarburizing

metals and other desirable processes will be presented to the metal industry through the agency of this new briquetting process under enormous pressures and proper time conditions.

The American Museum of Safety Chartered

The great bound with which the questions of accident prevention and workmen's compensation have sprung into prominence has made the American Museum of Safety the center of public interest. A special charter has just been granted it by the Legislature of the State of New York, thus putting it in the same class with the Metropolitan Museum of Art and the Museum of Natural History, in New York City. Among the trustees are E. H. Gary, Philip T. Dodge, James Speyer, Thomas Lynch, Arthur Williams, Edson S. Lott, Frederick L. Hoffman, George F. Kunz, Charles Kirchhoff, T. C. Martin, Charles A. Doremus, Louis L. Seaman, Frederick L. Hoffman and William H. Tolman.

The exhibits at the museum, in the Engineering Societies' Building, 29 West Thirty-ninth street, New York, include protective devices for the safeguarding of human life in almost every field of labor, from the turning of a grindstone to the moving of a freight train. The collections are of intense interest even to the ordinary observer, but of incalculable value to the manufacturer, for, at present, annually, in the United States, over 500,000 men are wiped out from the ranks of the wage earners.

Oil Fuel Burners in the Foundry

The oil fuel burners, manufactured by the Hauck Mfg. Company, New York, have been given a very extended application for foundry uses. In cupola lighting the flame is directed by compressed air against the coke bed, producing immediate ignition without injury to the lining. It is a useful adjunct in ladle drying, for which purpose it is arranged with a heating pipe extending into the ladle, the result being uniform heating to the required degree. The burner is employed in repairing defective parts, pre-heating them, if necessary, to the melting degree, a function which is also extensively used with various processes of welding. The burners have replaced old time methods of skin-drying molds, and are useful for baking molds in connection with specially constructed, sheet-iron boxes lined with asbestos.

The American Society of Engineer Draftsmen.—This society held its regular monthly meeting at its rooms, 116 Nassau street, New York, May 17. The committee appointed to investigate the bills for licensing engineers, now before the Assembly of the State of New York, reported that the McGrath bill appeared to be framed with a view to assist the man who is working his way up from the bottom rung. Letters were read from members resident in various States and Canada, defining local progress in the direction of licensing. Half of these letters opposed the principle of licensing, while the remainder favored it either wholly or in part. D. W. G. Eliot, of the topographical bureau of the city of New York, a sponsor of the McGrath Bill, addressed the meeting, showing the advantages claimed by his measure in a strikingly able and lucid manner, subsequently answering many questions put to him by those particularly interested.

The Massachusetts Institute of Technology has received a gift of \$500,000 from T. Coleman Du Pont, and is made residuary legatee under the will of Mrs. Emma Rogers, widow of William B. Rogers, first president and founder of the institute. The State of Massachusetts has appropriated for the school \$1,000,000, to be paid in 10 annual instalments of \$100,000. The Du Pont gift is to be used either for a new scientific building and its equipment or for a new site for the institute. Another gift just announced is a scholarship fund of \$500,000 under the will of F. B. Green.

The Conshohocken Iron & Steel Company, Conshohocken, Pa., has purchased the two old blast furnaces of the New Jersey Zinc Company, near Newark, N. J., and is dismantling them. The purchasing company did considerable work of this character under the direction of Alexander Hamilton, who has had a large experience in that line.

The Andrews Side Frame Patent Sustained.—Judge Kohlsaat, in the circuit court for the northern district of Illinois, entered a decree May 11 sustaining the Hardie patent, which covers the Andrews side frame, and holding that the Wolff truck frame manufactured under the Harrington patent by the Scullin-Gallagher Iron & Steel Company was an infringement.

A Four-Spindle Drilling Machine

The Sibley Machine Tool Company, South Bend, Ind., has recently placed on the market a four-spindle drilling machine to which the trade name Hi-speed has been given. This machine is of the all geared type and an effort has been made in designing it to combine all the features which

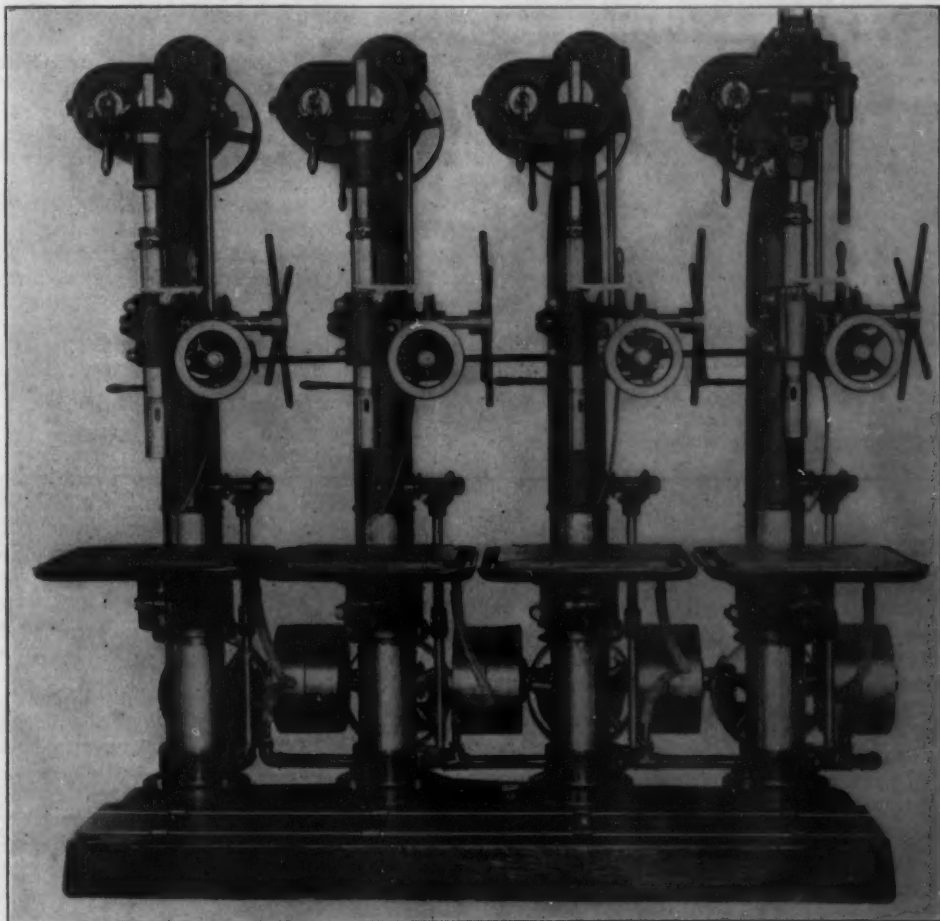
shafts. After it has been used, the lubricant returns to this tank through drains on each table.

The following table gives the principal dimensions and specifications of the machine:

Distance between centers, in	20
Swing, in	22
Number of spindle speeds	8
Minimum spindle speed, r.p.m.	99
Maximum spindle speed, r.p.m.	600
Overall height, in	80
Floor space, in	48 x 77
Weight, lb.	4500

In addition to the four-spindle type of drilling machine illustrated this company also builds two and three spindle machines which embody the same features in their construction.

The Detroit Steel Casting Company, Detroit, Mich., held



A New Four-Spindle Drilling Machine With Independent Spindle Drive Built by the Sibley Machine Tool Company, South Bend, Ind.

would add to operating convenience and effectiveness without undue complication of the mechanism.

The general construction of this machine follows that of the maker's standard line, which possesses the distinctive features of a very direct drive and the elimination of all parts which are not absolutely essential. The spindles are entirely independent of each other in operation. A separate quarter-turn countershaft is provided for each spindle instead of employing a single clutch for each; this arrangement being selected as it enables the full power transmitted by the driving belt to be delivered to all of the spindles and the trouble incident to the use of friction clutches is eliminated. The gear case is located on top of the column and the machine can be started and stopped and the speed and the feed varied and the spindle returned without making it necessary for the operator to go to the back or even to the side of the machine to make any of the ordinary adjustments.

Four individual square tables are furnished, which are placed so close together that they can be used as a single table for the whole machine or any separate one can be raised or lowered to accommodate different sizes of jigs. The fourth spindle is equipped with builder's standard geared tapping attachment. All of the four spindles are supplied with lubricant which is pumped from a central tank by a gear pump driven from one of the counter-

its annual meeting May 11. The reports of the officers showed that the year which had just closed had been an unusually prosperous one and that while business is now quiet the prospects for the coming year are considered good. The following officers were elected: J. S. Newberry, president; S. W. Utley, vice-president and general manager; W. S. Allen, secretary; F. P. Smith, treasurer; J. P. Warren, assistant treasurer.

The George M. Newhall Engineering Company, Philadelphia, Pa., has opened an office at 50 Church street, New York City, where the several lines of that company, together with the line of the Industrial Works, Bay City, Mich., will be represented. The new office has taken as its initial order for the Industrial Works two 100-ton wrecking cranes and one 12-ton locomotive magnet for the Seaboard Air Line Railway.

The Wm. Cramp & Sons & Engine Building Company, Philadelphia, Pa., launched successfully May 23 the battleship Wyoming, building for the United States. This vessel is one of the largest and is to be one of the heaviest armored ships in the navy.

The Fort Pitt Steel Casting Company, McKeesport, Pa., maker of small steel castings, is enlarging its power building and installing a 100-h.p. engine and generator.

Manganese and Silicon*

Their Use in Foundry Practice—The Future of Car Wheels—Silicon for Softening Cast-Iron

BY ALEXANDER E. OUTERBRIDGE, JR., PHILADELPHIA.

Manganese acts in two different and opposite ways in cast iron. When alloyed therewith in the cupola in considerable quantity, say 2 per cent. or over, it has a chilling and hardening effect, producing what I have termed a spurious chill of coarse crystalline nature, in contradistinction to the normal chill in a good car wheel which has a fine and closely interwoven crystalline structure.

When the alloy called ferromanganese is added in a ladle of molten car wheel iron in the small quantity given (1 lb. of alloy, containing about 80 per cent manganese, in 600 lb. of iron), it acts not as an additional contribution of 0.133 per cent. manganese to the metal in the ladle, but

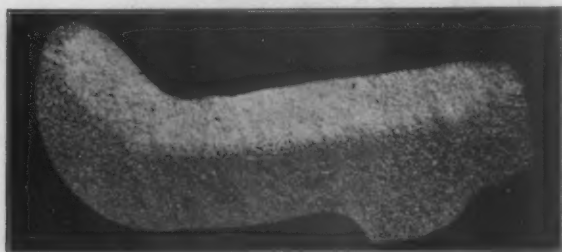


Fig. 1.—Section of 33-In. Car Wheel Cut From Treated Iron, Showing Fine White Crystals and Dark Gray.

simply as a deoxidizing and desulphurizing flux, cleansing the metal from impurities, softening it and greatly increasing the ductility and strength without injuring the chilled tread of the wheel.

The fact that ferromanganese was found to be so beneficial in car wheel practice soon led others to exploiting the alloy for general foundry purposes, but the conditions are here entirely different and in most cases this alloy is not only of no benefit, but is actually detrimental to foundry irons. I have already explained that it changes a large portion of the combined carbon in car wheel (or chilled roll) iron into graphitic form, but this remarkable effect cannot take place in ordinary foundry iron which contains usually scarcely more than a trace of combined carbon. The ignorant and improper use of ferromanganese in general foundries is sure to lead to disappointments.

Ferromanganese in Car Wheels

When we consider the greatly increased weight upon the wheels, together with increased average speed of freight trains and far more severe action of the brakes in recent years, it is truly wonderful that the chilled cast iron car wheel should still be able to maintain its foremost place, notwithstanding the improvements made in steel wheels and great reduction in cost of their manufacture. The steel wheel will, in time, I believe, supersede the cheaper cast iron wheel for the severest freight service, but the day is far distant when the chilled wheel will no longer meet the general requirements for rolling stock except for locomotives and passenger cars, and it is my firm conviction that as long as cast iron wheels are manufactured, the use of a small amount of ferromanganese, added in the ladle a moment before pouring, will continue to be a standard practice, for it has long since passed the experimental stage, and the recent attempt to create an impression that the introduction in the ladle of a minute quantity of manganese in the form of ferromanganese (less in amount than the natural variation found in good car wheels made by different manufacturers, or even by the same makers), produces an objectionable manganese chill, will fail to make any impression on intelligent persons who understand the subject and have practical experience in the business.

The foundryman should understand clearly from what has gone before that ferromanganese and ferrosilicon possess entirely different functions in cast iron and should not be used indiscriminately or in conjunction. Ferromanganese is best adapted to the treatment of high chilling iron for car wheels or chilled rolls, or other chilled

castings where the proportion of combined carbon is large.

Ferrosilicon is best adapted to treatment of foundry iron when from any cause it is hard and brittle, since it possesses the peculiar property of softening and at the

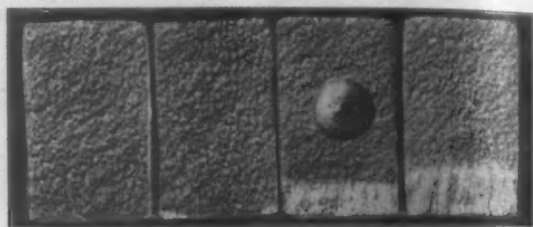


Fig. 2—Four Specimens of Pig Iron Containing Silicon, Cast in Green Sand Molds Against a Chill Block On One Face.

same time strengthening such iron. It also enables the founder to vary the grade of iron in individual ladles to suit individual castings or groups of castings. It gives the founder control of his iron after it has been withdrawn from the source of melting, a matter of great importance and value, and it enables him to use cheaper grades of iron.

Finally, I wish to say that neither ferromanganese nor ferrosilicon can be regarded as universal panaceas, as some unscrupulous salesmen would have the foundryman believe, and, while each in its proper place is of great value, they must, like all other good things, be used intelligently, and if impure adulterated materials are employed they will not only prove to be of no benefit but may be absolutely harmful.

The Influence of Silicon

The influence of silicon in softening pig iron and reducing its chilling property is clearly shown in Fig. 2. Four test pieces were cast in green sand molds, one face in each being formed with an iron block. The only important difference in composition between the specimens is in the amount of silicon in each. The one on the left contained 0.7 per cent. silicon, the one showing a hole where a drill had been used to obtain borings for analysis contained about 0.8 per cent. silicon. The next contained a trifle over 1 per cent. silicon, and the specimen on the right nearly 2 per cent. silicon. In this case mere "skin chill" is noticeable on the upper face against the chill block. The remarkable effect of cooling gray iron very suddenly is shown in Fig. 3. Here the molds are heavy iron chill cups; some are 1/2-in. section, others 1-in. section, others about 3/4-in. round section. All of these specimens are absolutely white iron. Samples of the same iron poured in green sand molds of about the same size were all perfectly gray in fracture. It will be observed that the white iron crystals always form at right angles to the chilling surface of the molds, presenting an appearance resembling spokes of a wheel in those of round section, and showing a cross at

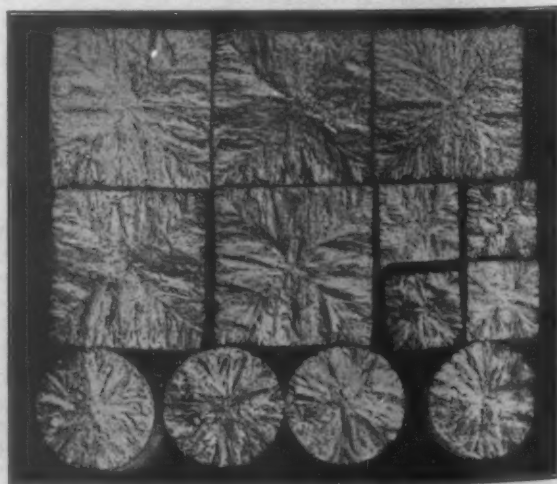


Fig. 3.—Specimens of Gray Iron Cast in Heavy Iron Chill Cups.

the nodal lines, or points where the crystals meet, in the specimens of square section. The lines of demarcation are as sharply defined as though scribed with a tool on solid metal, and it is possible, in some cases, to split the specimens lengthwise along these lines. The specific gravity of the gray iron is about 7.2, while that of the white iron is

*Delivered at Convention of the American Foundrymen's Association, May 23-26, 1911.

nearly 8. There is, however, an appreciable difference in density of different specimens of white iron just as there is a well-known difference in density of different specimens of gray iron. There is also a marked difference in hardness of white iron crystals.

Progress in Heated Foundry Mixers *

BY J. B. NAU, NEW YORK.

At the meeting of the American Foundrymen's Association, held in New York in June, 1905, the writer recommended the use of a heated mixer as an intermediary receptacle placed between the blast furnace and the foundry, into which iron from the blast furnace could be poured, kept liquid for any desired length of time, and its quality corrected by suitable additions of either liquid or solid pig iron, or by additions of wrought scrap, should it be desired to obtain a metal with lower carbon contents. From this mixer the metal was to be withdrawn whenever needed in the foundry. Its use was more especially recommended in pipe foundries. Since then some progress has been made in that direction, but less in this country than in Germany, where foundry mixers are said now to be introduced in different places and where, up to the present at least, their use is particularly advocated wherever possible as a valuable addition to cast-iron pipe foundries.

The writer knows of one pipe plant of modern design, which he had an opportunity to visit in Europe in 1905, and which, for lack of capital, was not in operation at the time. It has since been bought up by a blast furnace plant, located at a distance of some two miles and will be put in operation as soon as a suitable mixer is put up at the pipe plant, to which the liquid iron from the two blast furnaces will be delivered.

Like all modern mixers used in steelworks, foundry mixers are usually in the shape of open hearth tilting furnaces, either enclosed in a round iron shell or preferably in the more modern ones with the top of the roof exposed to the open air, for the purpose of keeping it cool and making it more durable. Their heating is mostly done by producer gas and even in some cases by blast furnace gas. One regeneration is deemed sufficient for obtaining a good steady temperature. In some cases even, where sufficient proximity allows it, heated air from the blast furnace hot blast stoves is recommended, so as to avoid regenerators.

In this country there is at least one foundry mixer in use in a well-known Western plant, where for about two years now 250 tons of mostly very heavy castings are made every day in a ten-hour shift, with direct iron from the blast furnaces suitably mixed in a 100-ton mixer before pouring it into molds. The mixer, without regenerators, is of the tilting style, brick lined, oil heated, and as the castings poured from the mixer irons are very heavy and the temperature of the iron at the moment of pouring into the mixer is high enough for the foundry operations, only a small amount of oil is used for heating purposes.

The silicon content varies within the extreme limits of 1.25 and 1.75 per cent., while the sulphur is generally kept between 0.06 and 0.035 per cent. The latitude in the silicon content makes it possible to do away with any additions of pig or scrap or other suitable alloys, which additions otherwise be necessary to correct the quality of the iron.

Direct iron from the blast furnace is brought up in 30-ton ladles and the choice of the iron to be taken to the mixer is left to the care of a man trained especially for this purpose.

Where Small Castings Are Made

The question of the use of a foundry mixer becomes more complicated, where the iron is destined to be used for small castings, and has to be at a necessarily higher temperature, where the silicon content is allowed to vary only within narrow limits, and where it is desirable to carry the same silicon content throughout. Under such conditions outside additions of a suitable kind will have to be made to bring the metal to what might be called a standard analysis. When, furthermore, the nature of the foundry work is such as to make it unavoidable to keep the liquid metal in the mixer exposed for hours to the action of the flame, some further precautions will have to

be taken to prevent the gradual desiliconizing of the foundry iron under the action of the flame as well as the slag that may form during the operation. In this respect the operations in the foundry mixer will differ entirely from the operations carried out today in the mixer used in connection with open hearth furnaces. In this mixer partial refining of the metal is contemplated and fostered. In the foundry mixer, on the contrary, desiliconizing must be avoided.

Formation of Non-Refining Slag

From the treatment of liquid foundry iron in a furnace, where the writer took precautions against refining of the metal from the first moment on, it was proved that with the formation of a thin layer of slag of a non-refining nature on top of the liquid bath of metal, foundry iron can be kept exposed to the action of a flame at a high temperature for an indefinite length of time without in any way changing the silicon content of the metal and without deteriorating it in the least. In this respect the writer ventures to state his belief that the metal will rather improve in quality.

Iron running from the blast furnace into a ladle will naturally lose through oxidation some hundredths of 1 per cent. of its silicon content. With only ordinary precautions this loss can be kept well within 0.10 per cent. of that element, or not more than will naturally take place with iron running from the blast furnace into the pig iron molds. During its transfer from the blast furnace, some of the sulphur and manganese will be eliminated by mutual reaction, the resulting product finding its way into the slag, where together with the silica and some FeO formed, and some other impurities, it will constitute a thin protective slag covering, preventing any further outside oxidation. Pouring the metal from the ladle into the furnace above the slag will form a protective cover over the metal bath in the furnace.

It is not enough, however, to interpose such a layer of slag between the metal and the flame, but it is further necessary to make and maintain the slag of a non-refining nature; otherwise the slag itself would desiliconize the metal much more than an oxidizing flame could do it. Such a slag can easily be obtained with the application of some very elementary precautions that can easily be carried out and that have for their purpose the formation of a slag low in refining elements.

The non-refining slag that the writer produced in the first three heats made in the treatment of more than 80,000 lb. of foundry iron amounted to less than 500 lb., and had in its composition:

SiO ₂	= 56,720
FeO	= 3,605 = 2,805 Fe
Al ₂ O ₃	= 13,140
MnO	= 6,700
	<hr/>
	80,165

The balance was undetermined.

Assuming that half of the Si of the slag is derived from the iron and the other half from the refractory lining, which was only very slightly attacked, it will be found that only 0.08 per cent. of the silicon was eliminated and this happened mostly in the ladle.

An examination of the analysis of the slag will show that only about 120 lb. of its weight can possibly come from the iron, corresponding to 0.15 per cent. in weight of the 80,000 lb. of iron treated as against 4.5 per cent. = 3,600 lb. loss that would have happened in the cupola.

The sulphur and manganese content of the iron from the mixer are less than the corresponding contents of the iron from the blast furnace. The silicon may be made any desired amount with suitable additions and once the amount is established it can be maintained without variation for any length of time from the beginning to the end of the cast. But if the iron in the furnace is left exposed to the refining action of the flame and the slag, without taking any precautions against refining, slow desiliconizing, that in a special case corresponded to about 0.10 per cent. elimination of that element per hour, will take place. With the necessary precautions against desiliconizing, it was found that an iron with 1.90 per cent. Si at the moment of pouring the metal in the furnace, contained 1.86 per cent. of that element after 19 hours of exposure to the hot flame.

By additions of ferro-silicon, the silicon was sought to be increased to 2.30 per cent. while it actually reached 2.28 per cent., at which figure it was maintained to the

S. DIESCHER & SONS.

Mechanical and Civil Engineers.

*A paper read before the Pittsburgh convention of the American Foundrymen's Association, May 23-26.

end of the cast 28 hours after the iron was poured into the furnace.

Advantages of the Mixer

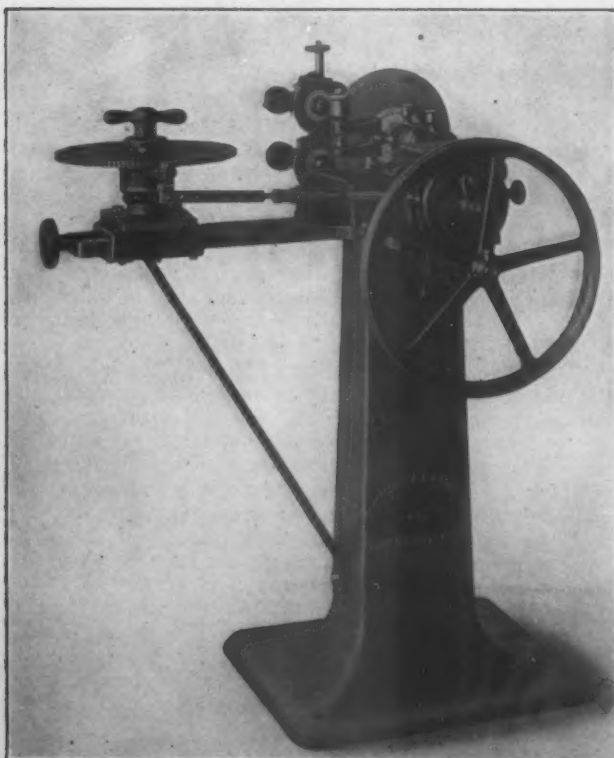
The new figures thus submitted show sufficiently what the application of the mixer to the foundry will do for the latter. The advantages derived from the use of the mixer therefore comprise the complete avoidance of the loss of silicon and furthermore a very notable reduction of the sulphur content with a correspondingly slight reduction of manganese from the iron. With some 0.5 to 0.8 of manganese in the iron the sulphur will be reduced by some 10 per cent. to 25 per cent. of its original content, even if the iron coming from the blast furnace contains only 0.03 sulphur or less. Mechanical tests made with the iron from the mixer also show an increase of about 40 per cent. over what the same iron after its remelting in the cupola would show.

The mixer, therefore, greatly improves the quality of an iron that by its treatment in either the cupola or the air furnace would be deteriorated within varying degrees. Owing to this characteristic the mixer will find its place in other foundries than those of large and heavy castings and of large tonnage. Wherever the quality of the castings to be obtained overshadows to a sufficient degree their price, the mixer can be built in very small units.

In nearly every case where direct metal from the blast furnace is available the mixer can easily take the place of an air furnace. Air furnace metal costs on an average $\frac{1}{2}$ cent a lb. more than cupola melted metal. While in some cases mixer metal might cost more than cupola melted metal it would nearly invariably cost less than air furnace metal, and metal for metal it would be of superior quality to the air furnace product. For instance, rolls that today are cast from air furnace metal could be made more cheaply and of better quality from mixer metal.

An Automatic Saw Sharpener

The automatic saw sharpener shown in the half tone is designed by its builder, the Nutter & Barnes Company, Boston, Mass., with the special feature that it will back off and form a Brown & Sharpe patent relieved tooth at one setting in the time required for plain gumming. The four different operations necessary in forming one relieved tooth are performed by cams and gears at each advance of the main gumming wheel, at the rate of 40 to 50 teeth per minute, varying according to the diameter of the saw. The automatic indexing is from a 12-in. disk having teeth equal in number to those of the saw. The machine will also



The Nutter & Barnes Company's Automatic Saw Sharpener for B. & S. Patent Relieved Teeth.

sharpen the face and form the gullet of a plain straight tooth.

The function of the gumming wheel is to gum, sharpen the face, back off and regulate the two lengths of saw teeth, the narrow, alternating teeth being $\frac{1}{64}$ in. longer than the full width teeth. The two 4-in. straight narrow grinding wheels bevel and form the clearance on the bevel of the alternate bevel teeth, the proper clearance being given as the wheels are gradually withdrawn and the saw starts to revolve. In the same manner full width teeth receive their backing off from the corner of the beveled wheel, as the teeth are revolved past it.

The variation called for in backing off the teeth is obtained from an adjustable feed cam, in which are holes located to receive an index pin in an arm on the cam shaft. Each hole is marked for the different number of teeth in saws of various diameters.

The machines are built in two sizes, one taking saws from 12 to 20 in. in diameter, the other saws from 12 to 36 in. in diameter.

Barthold Gerdau Visits This Country

Barthold Gerdau, a noted mechanical engineer of Duesseldorf, Germany, arrived in Pittsburgh a few days ago. He and Dr. Franz Haniel, of the firm of Haniel & Lueg, Duesseldorf, came over on the invitation of George Mesta, president of the Mesta Machine Company, to attend the spring meeting of the American Society of Mechanical Engineers in Pittsburgh this week. Mr. Gerdau will read a paper at the morning session of the meeting on Friday, June 2, on "Power Forging, with Special Reference to Steam Hydraulic Forging Presses." He has brought with him a number of lantern slides for use in illustrating his paper, which will show forging operations in the Krupp Works and other large forging plants in Europe. This paper and the illustrations will be of great interest to engineers in this country, as the forging press will soon displace the steam hammer here as they have already done in Europe.

Mr. Gerdau received his education in some of the best technical schools in Germany. After completing his education he went to England, where he was connected with the building of the steel works of Bolckow, Vaughn & Co., Middlesbrough. After leaving there he spent some time in Belgium and France. At the present time he is chief engineer and managing director of the firm of Haniel & Lueg, which since then has done some very important government work in Germany, including the hydraulic central power station in the free port of Hamburg. Mr. Gerdau also designed the large hydraulic swing bridges over the North Baltic Canal, as well as the renowned ship lift in the Dortmund-Ems Canal near Henrichenburg, which was an undertaking of very great importance. The German Government bestowed upon Mr. Gerdau, in recognition of his great achievements, the Order of the Crown and the Order of the Red Eagle. Mr. Gerdau also designed the steam hydraulic quick-acting forging press, now known as the Haniel & Lueg system, which has been adopted by the Krupp Works and by most of the other large forging plants in Europe.

The Mesta Machine Company has recently arranged with Haniel & Lueg for the exclusive right of building these steam-hydraulic forging presses for the United States and Canada. It has just built and put into operation a 200-ton and an 800-ton press of this type in its own plant at West Homestead, Pa. These presses will be in operation on Friday afternoon, June 2, when the American Society of Mechanical Engineers and the Engineers' Society of Western Pennsylvania will visit the Mesta plant.

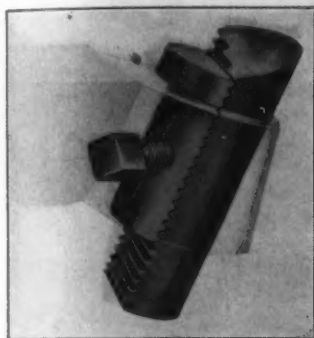
The suit for infringement brought by the National-Acme Mfg. Company, Cleveland, Ohio, against the Universal Machine Screw Company, Hartford, Conn., has been settled out of court on the payment of royalties for past infringement and the expenses of the action by the Universal Company to the National-Acme Company. A non-exclusive license has been issued to the Universal Machine Screw Company under which it may continue to build, use and sell multiple-spindle screw machines embodying the subject matter of the letters patent which have been infringed, in consideration of the payment of a royalty on all machines so built to the National-Acme Mfg. Company.

Roughing Tool for High-Speed Steel

A Red-E Product Designed to Eliminate a Tool Dressing Outfit

A notable development has been made in the matter of high speed and fast feeding in metal cutting, in connection with metal working machinery, by the Ready Tool Company, Bridgeport, Conn., in the production of what is known as its Red-E roughing tool, style R, for giving to the machine tool operator the cutting contour and cutting angles generally acknowledged to be essential features in the successful use of high speed steel. An idea of the tool may be gained from the accompanying illustration. From one standpoint it may be regarded as a signal help in the effort which has been apparent for some time to maintain the production of tool holders capable of meeting the increased efficiency of machines.

It appears that the tool has been designed along the line of the standards established by Fred W. Taylor and in the adaptation of the idea incorporated in the Red-E tool, the assistance of one of the associates of Mr. Taylor was secured. In short, to have the bar of tool steel, shown as a feature of the round nose roughing tool, possess the proper contour and remain capable of being quickly set in the holder in such a way that the pressure at the cutting edge would be properly transmitted through the



The New Style R, Red-E Tool.

holder, is not as simple as one would imagine at first glance. The tool had to be designed so that the resultant pressure of the work could be carried downward through the cutter and dog to the base of the tool in order to secure a rigid appliance, free from chattering. The idea behind the tool is of course the aim to secure the economical advantages of a tool holder without requiring high priced blacksmith treatment and tool dressing, and without requiring an equipment of apparatus so commonly provided in the case of high speed tools.

Among points on which emphasis is placed is the fact that one grind only is necessary to maintain the correct cutting contour and the correct angles. By flat surfaces on parts of the tool steel bar the grinder operator soon gets proficient in getting the proper angle without the use of a templet, and at the same time the proper side and front clearance are automatically maintained, and claim is made of abundant mass of steel to dissipate the heat satisfactorily.

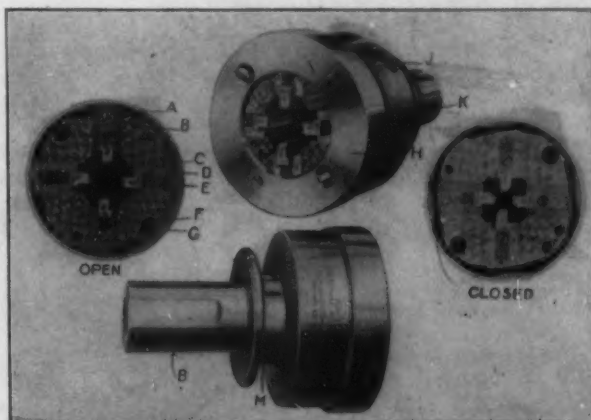
It is assumed in the foregoing that the increased amount of work which can be enjoyed with the same power consumption by the use of the Taylor angles is admitted. Oftentimes the individual lathe hand, when allowed to grind his own tool, is apt to get a speed and feed less than if the Taylor standards are used. In short, the company feels that it has combined in the tool the three factors necessary to produce the best metal cutting tool: shape of cutting edge, proper cutting angles and proper treatment of high speed steel.

A New Self-Opening Die Head

A new type of die head, the construction of which embodies radical departures from previous designs, has been developed by the National-Acme Mfg. Company, Cleveland, Ohio. It was developed primarily for use on the maker's Acme automatic multiple spindle screw machines and others with revolving threading devices as the result of a series of experiments covering a period of more than two years. During that time all of the standard types and others embodying departures from this construction were investigated. As the die is designed especially for use on machines where the threading spindle is revolved, it can be operated while the latter is in motion.

As is shown by the engraving, this design of die requires an exceptionally small number of parts as compared

with other types, and the arrangement of these is such that the die can be easily taken apart and reassembled. This, however, is seldom necessary, as the cap H covering the head prevents chips from entering the working parts and the arrangement of the internal parts in the head provides plenty of room between them, with the exception of the



The New Self-Opening Die Made by the National-Acme Mfg. Company, Cleveland, Ohio.

cam pieces and the surfaces they bear upon. In this way any grit which may be carried by the oil and other foreign substances into the die can work out into the clear spaces and then out of the head through holes left for this purpose in the sides of the head.

Referring to the engraving, which shows the various parts of the die, A is the body holding the working parts and B the head containing the chaser blocks. The cam operating block is indicated by C and the chaser block and the chaser by D and E respectively. The former has an adjusting cam milled on the rear end and the latter can be removed by loosening the screw F. The body and the head are held together by screws, G. The adjusting screw K is provided with micrometer graduations, J, and the shoe is closed by the groove M.

The chasers E can be removed from the jaws without displacing any of the other parts, and their design is such that a practically perfect thread can be cut without employing a follow-up cam. The cam arrangement on the chaser blocks D provides a very liberal adjustment for size which is controlled by a screw, K, having a very fine pitch and plainly marked micrometer graduations, J. The jaws which hold the chasers and the cam surfaces controlling the closing of the die are hardened and ground. They also have a very wide bearing on the cam surface and are thus held firmly in position when the die is closed. The parts upon which the adjustment of the dies or the operation of the closing cams depend are free from springs.

All the parts of the die are made interchangeable, an arrangement which facilitates reassembling or the replacement of worn or broken parts and all the points subject to wear, such as the cam surfaces, &c., are hardened and ground. If it should become necessary to take the die apart for cleaning, this can be easily done by removing the cap H from the front face of the die and then washing in the oil or other cleansing compound. In this way the die is thoroughly cleaned without removing any other parts.

It is reported that the Keystone Furnace Construction Company, Fulton Building, Pittsburgh, Pa., is interested in the organization of a corporation to take over the Niles Boiler Works at Niles, Ohio, in which it will manufacture its own cooling devices. The Keystone Company has met with great success in its Knox patented water cooled ports, doors and door frames for open-hearth furnaces, and in addition to these products will manufacture a general line of pressed and welded steel specialties.

A further step in the reorganization plans of the Baldwin Locomotive Works, Philadelphia, is the announcement that application will soon be made for a new charter, under Pennsylvania laws. It is said that the new corporation will be known as the Philadelphia Locomotive Works. The company has received orders for twenty 10-wheel freight engines for export to Australia, but officials state that the outlook for business is still rather unsatisfactory.

New Bullard Vertical Turret Lathe

The Maxi-Mill Type, Which Contains a Number of Important Developments—An Interesting and Comprehensive Lubricating System

The vertical turret lathe, shown in the illustrations, is the 42-in. Maxi-Mill type of its builder, the Bullard Machine Tool Company, Bridgeport, Conn. The machine has one swivel turret head and one non-swiveling side turret head. Its capacity is 44 in. in diameter, 32 in. in height under

The table is driven through planed beveled gearing, having a special tooth form, which has a rotative effect only. The company's experience extending over a period of years has demonstrated to its satisfaction that the beveled drive is superior to the spur drive, noticeably in the

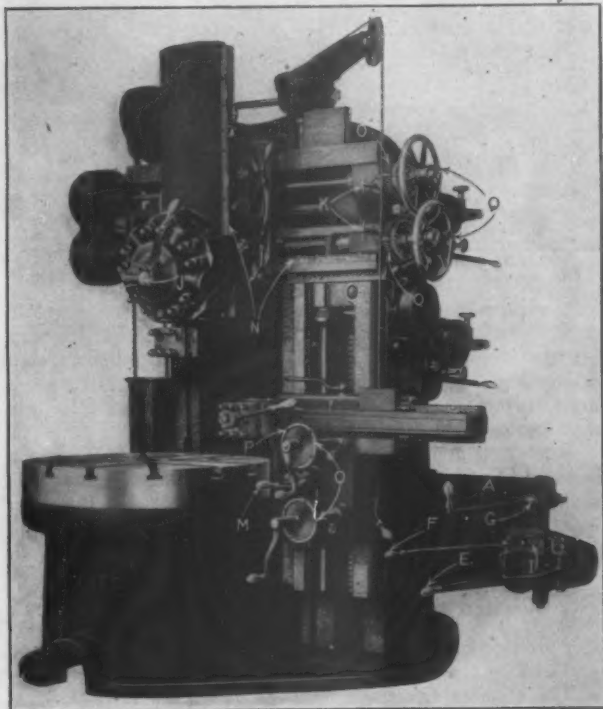


Fig. 1.—The Maxi-Mill Type of 42-In. Vertical Turret Lathe Built by the Bullard Machine Tool Company, Bridgeport, Conn.

cross-rail, and 42 in. under turret face, the maximum distance from the table to the turret face being 43 in. It marks another step in the development of the company's very interesting line of vertical lathes. The effort of the designer has been to secure a machine tool having extreme power, continued accuracy, great rigidity, convenience of

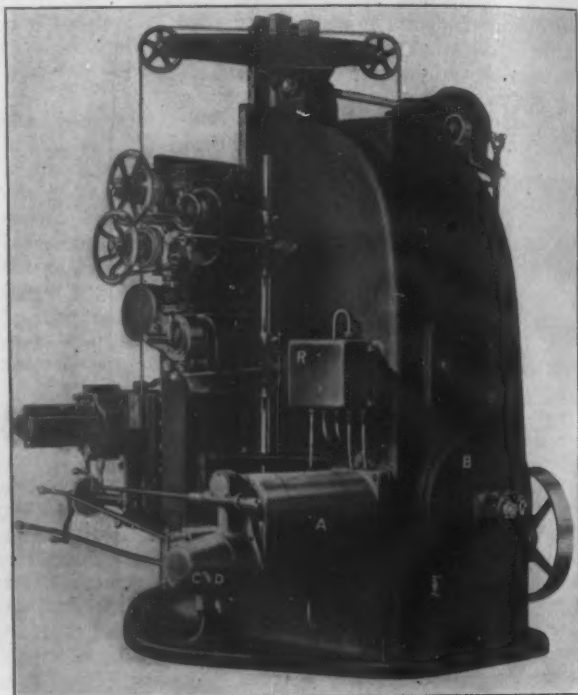


Fig. 2.—Rear View of the Lathe.

smoothness of the cut and the absence of chatter and tooth marks. The table spindle is of the standard Bullard type, having angular thrust bearings of large diameter, the side strains being absorbed by vertical cylindrical bearings, as shown in Fig. 5. The table spindle journals are of cast-iron, scraped to create a bearing on the spindles. No adjustment is required, and therefore none is provided. The entire spindle is immersed in oil.

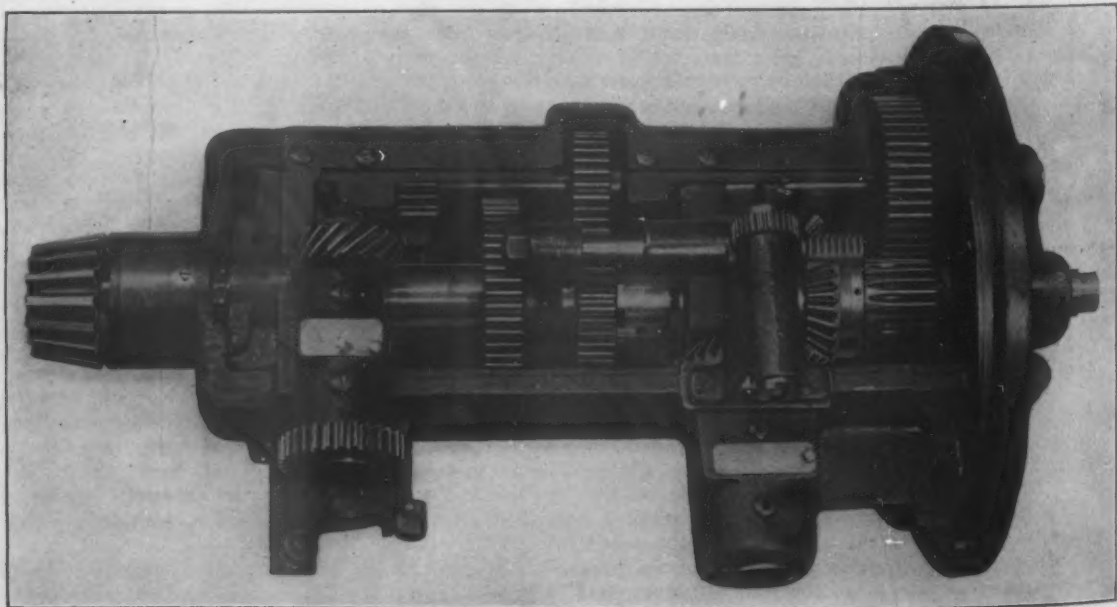


Fig. 3.—One of the Speed Changing Clutches.

operation, absolute safety of the operator and a minimum cost of maintenance. There are 12 changes of table speeds and 8 positive and independent feed changes for each head.

The Lubricating System

The designer has created a very interesting system for lubricating the table spindle, as will be noticed in Figs. 5 and 6, and in fact throughout the machine.

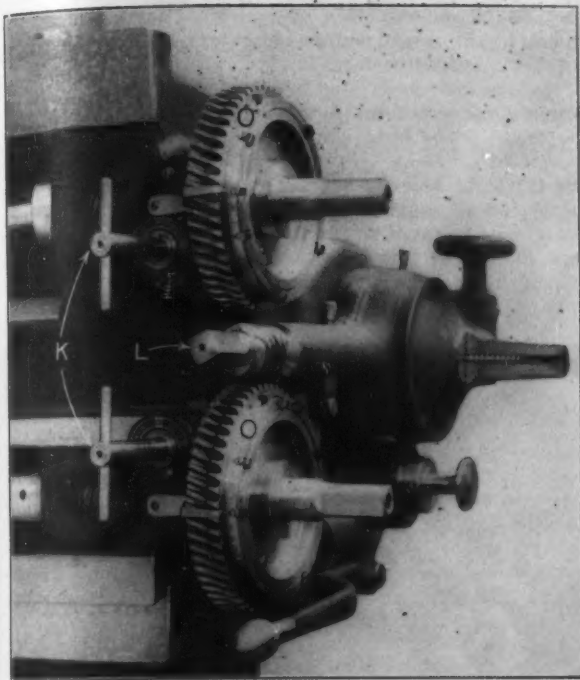


Fig. 4.—The Micrometer Stops and Observation Dials Used in Duplicate Work.

The company started with these axioms: Power efficiency is increased through the reduction of frictional loss in gears and bearings; cost of maintenance is reduced by the elimination of wear; productive time is increased by thus utilizing the time ordinarily required for the daily filling of numerous oil holes and cups; the manufacturer is insured against loss of productive time, interest on investment, derangement of manufacturing schedule and the cost of repairing a ruined bearing due to the operator's oversight of an oil cup.

To accomplish these results the base of the machine forms an oil reservoir to which all of the oil is returned after passing through the various bearings and gear boxes. Submerged therein and direct-connected to the main driving shaft is a gear pump which delivers the oil to a distributing reservoir, R, Fig. 2, located on the outside of the column at such a height as to insure sufficient head for the free flow of oil through the ducts leading therefrom to the bearings and individual reservoirs in which the gears revolve, the excess oil pumped to the distributor being returned to the pump by an overflow pipe. Feed-change brackets, power traverse-brackets, and rail-raising bracket, having a variable relation to the column, form self-contained reservoirs in which the level of oil must be maintained. Oil level indicators at all points are provided in order that the proper amount of lubricant may be maintained. All other bearings are oiled through self-closing oilers, which also indicate the parts requiring this attention.

In the oil sights in the ducts the free flow of oil is clearly indicated in two ways, by the size of the oil column passing the opening if the pipe is clear and by the overflowing at the opening if the pipe becomes stopped up, a construction shown in Fig. 6.

In Fig. 5 the method of lubricating the table spindle is shown in detail, together with the lubrication of the table driving gear and pinion. A spiral groove seen at *a* serves to lift the oil from the base as the spindle revolves. When the table is at rest the oil takes the direction as designated by the arrows. At *c* are the grooves in the spindle seat. Oil chains are used in all the bearings and also right and left spiral grooves in the shaft, as indicated at *d*. The flow of oil to the bearings is 0.02 qt. per square inch per minute, or 1 qt. to 50 sq. in. of projected bearing area.

The Machine in Detail

With the single driving pulley running at 360 r.p.m., the 12 table speeds range from 3.1 to 60 r.p.m. The speed changes are obtained from two systems of selective sliding gears and positive clutches, the location of which is shown at *A* and *B*, Figs. 1 and 2. Only the gears transmitting power are in mesh, no power being consumed by idle running gears. A multiple or disk clutch, *C*, Fig. 2, which is

easily adjustable, is interposed between the main driving shaft and the primary speed change mechanism. As the members run at a constant speed, the efficiency does not vary. The brake, *D*, is integral with the driven member of the disk clutch, and, running at constant speed, has a constant braking value, regardless of the table speed. The clutch and the brake are operated by one lever, *E*, Fig. 1, and the engagement of one disengages the other. Any one of the four primary speeds may be engaged by the lever *F* and the secondary speed changes by the lever *G*. The controlling levers are interlocking. The clutch must be released and the brake engaged before a speed change can be made and a complete engagement of gears for any speed is necessary before the brake can be released and the clutch re-engaged. This system does not interfere with rapid manipulation, but serves as an absolute safeguard against breakage due to the carelessness of the operator.

It will be noted that all operating levers and handles are located to give a centralized control. The number of table revolutions per minute may be ascertained from the direct reading indicator, *I*, incorporated in the interlocking device.

The two heads are entirely independent in movement, both as to direction and amount of feed. They can be operated jointly on work of small diameter without interference. The vertical head may be rapidly moved in all directions by power independent of the feed works or table drive. The vertical and the cross motions in either direction may be engaged singly or simultaneously, the operating mechanism being independent. A safety device is provided to prevent damage resulting from carelessness. The feed works of each head has eight changes ranging from 1/96 to 1/4 in. in all directions. The changes are obtained by turning a knurled wheel, the amount of feed per revolution being indicated on a direct reading index plate on each feed box. The feed of the main head is engaged and disengaged, or a change made from vertical to cross feed, or vice versa, by engaging the centrally located drop worm *L*, Fig. 4, with worm gears on the end of the feed rod and the feed screw. The feed of the side head is similarly controlled by the movement of the plunger lever *M*, Fig. 1, located in the side head saddle. The friction gearing is operated by the lever *K*, controlling a rod extending through a hole in the feed screw and rod.

A graduated scale is attached to the main turret slide and another to the tool slide of the side head, as shown at *N*, the purpose being to assist in the setting of tools. Index dials, *O*, graduated to 0.001 in. are mounted on the feed rods of both main and side heads. These dials are of large diameter and the graduations are therefore widely spaced and easily readable. Observation stops, bearing numbers to correspond with those on the faces of the turrets, are adjustably mounted on graduated scales and micrometer dials, *P*, form an invaluable adjunct in the duplication of sizes.

The rod and screw of the main head revolve rapidly when the power transversed mechanism is engaged. Crank handles have been supplanted by hand wheels, *Q*, mounted on sleeves secured to the rod and screw. The wheels are free to make a partial revolution on the sleeve before becoming engaged therewith, the engagement imparting a

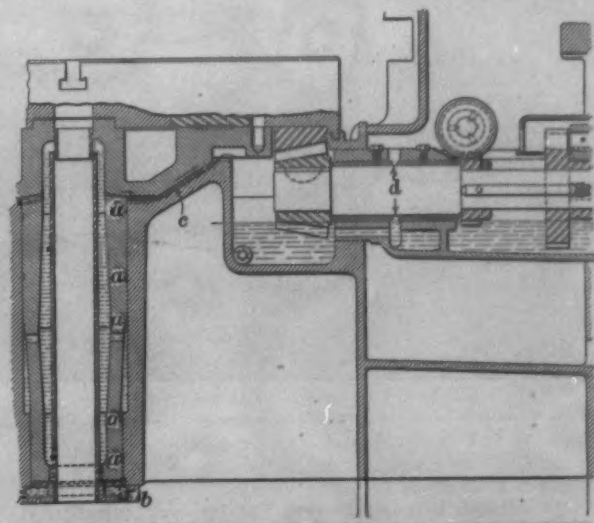


Fig. 5.—Constructional Details of Table Spindle.

hammer action similar to a tap of the hand on the end of a crank handle. The finest adjustment of tools is made possible by this arrangement.

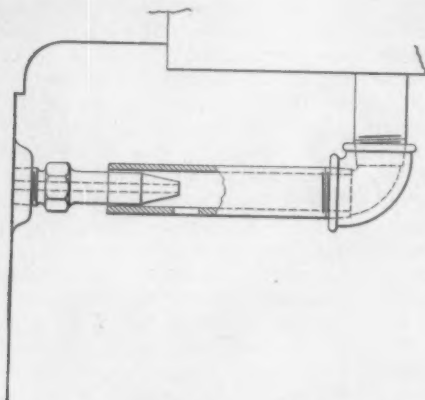


Fig. 6.—One of the Sight Feeds.

A thread cutting attachment for the vertical head can be furnished, arranged for 11 changes, ranging from 2 to 16 threads per inch. This mechanism is arranged so that

the power rapid traverse may be used in returning the slide and the thread cutting feed may again be engaged without splitting the thread.

An accurate center stop is provided for the main head, designed to permit the latter to be carried 3 in. beyond the center. The head will face 44 in. and has a vertical movement of 27 in. Its turret is 16 in. in diameter with five faces, the holes of which are $2\frac{3}{4}$ in. in diameter. Being set on an angle, it will swing large tools clear of the slide. The turret is revolved by the lever J, one turn for each face. The side head has a vertical movement of 28 in. and a horizontal movement of 21 in. The maximum distance from the table to the under side of the cross slide is 25 in. A four-face turret tool holder on the side head obviates the necessity of a constant change of tools. Tool steel $1\frac{1}{2} \times 1\frac{1}{4}$ in. may be used.

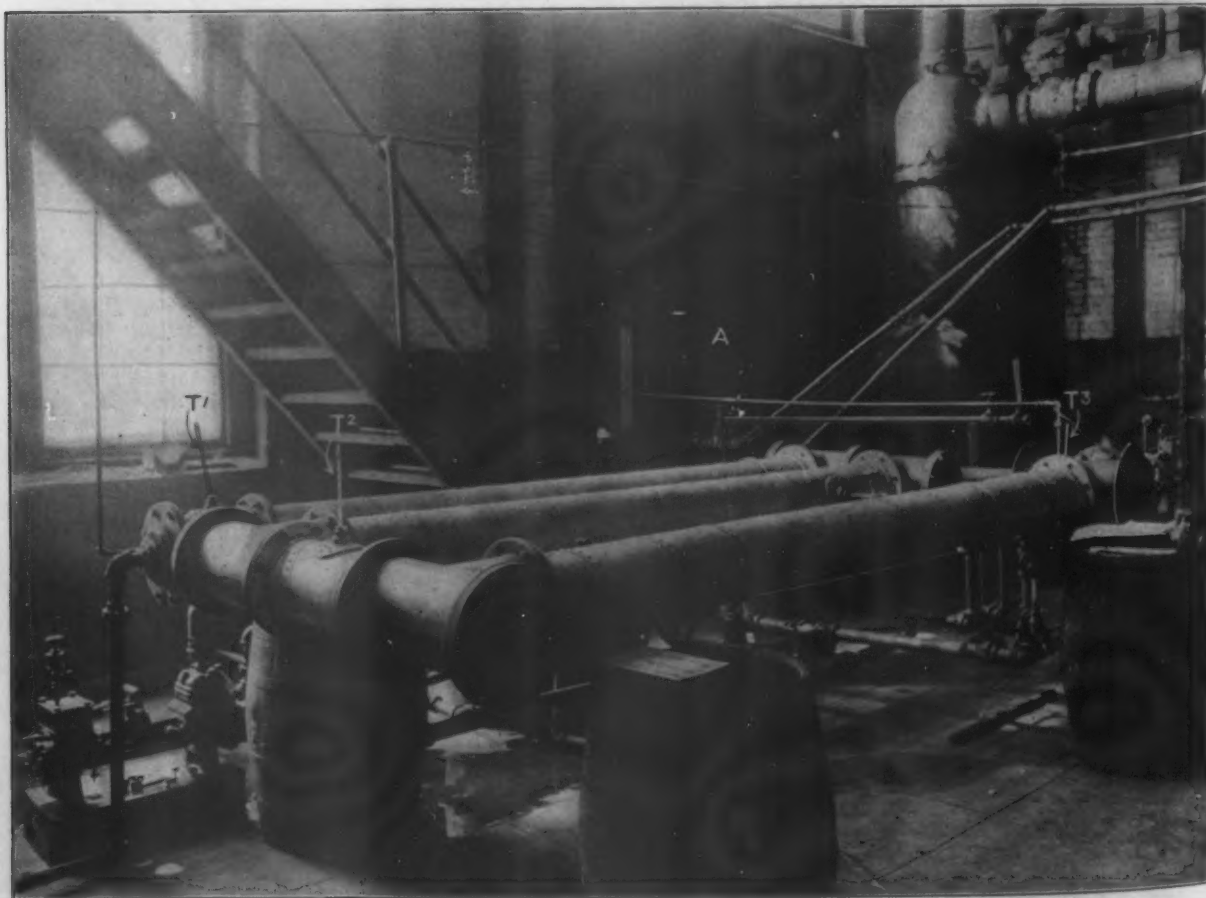
The lathe is of massive construction throughout, its net weight on the floor being 18,500 lb. Great pains have been taken in developing this type in the selection of materials from which the various parts are manufactured. The machine is easily adapted to an electric drive. A 10-hp. constant speed motor having a speed not exceeding 1200 r.p.m. may be mounted on a bracket at the rear of the machine and connected with the driving pulley by a belt. The floor space required is 85 in. wide, 93 in. deep and the overall height is 121 $\frac{1}{2}$ in.

New Dry Blast Process Tested

System Employing River Water and Refrigerated Water Sprays After Compression

An important development in the use of the dry blast for blast furnace operation, bringing about a large reduction in the first cost of the apparatus and also in the cost of operation has been made by John B. Miles, civil

The process, in brief, involves cooling the air after it leaves the blowing engine. This is done by sprays of water in two stages. In the first stage, river or lake water is used and in the second, refrigerated water. By treating



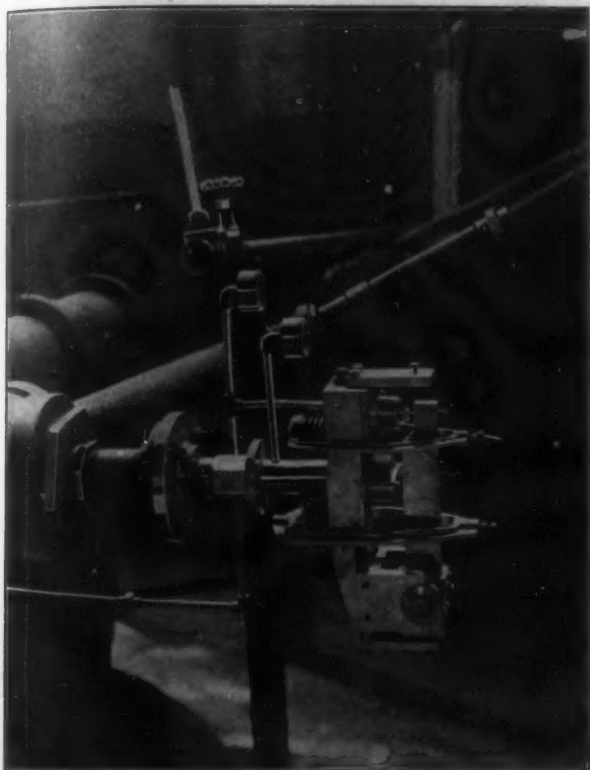
Apparatus Used for Testing Miles Process for Drying Air.

engineer, Real Estate Trust Building, Philadelphia, Pa. Extended tests made to prove the fulfillment of the object of the process bespeak success for the first installation, in connection with a blast furnace which, it is expected, will be in operation in the late summer.

the air after compression instead of before compression, it is not necessary to cool it to such a low temperature as in the latter case, in order to reduce the moisture to the same content. Inasmuch as natural water may be used in removing the heat of compression, the necessary capa-

city of the refrigerating apparatus is much less than when cooling before compression is employed. That cooling to a higher temperature is possible for the same result is due to the fact that a cubic foot of space can contain the same maximum of moisture at a certain temperature, no matter what the pressure may be.

As a result of cooling after compression, when the blast pressure is, say, 10 lb. per sq. in., the amount of moisture can, it is stated, be reduced to the equivalent of 1.38 grains per cubic foot of free air, when water is used



Device for Regulating the Amount of Drying.

in the sprays of the second stage. If brine is used in the second stage, the temperature of the brine can, of course, be carried below that of refrigerated water and the moisture can be eliminated to a greater extent.

The use of sprays of water, of course, does away with the large amount of piping needed in dry blast systems in which the air is passed over pipe coils containing the refrigerating medium, and this, of course, means a reduction in first costs, estimated by Mr. Miles at one-half to two-thirds the cost of the ordinary dry blast plant. The application of the cooling effect to the air after compression reduces, as explained, the horse-power requirements of the plant, and this is of importance particularly where the furnaces are operated in connection with a steel plant as then any surplus steam doubtless will be utilized by the engines of the steel plant.

The accompanying reproduction of photographs of the testing plant will assist in giving an idea of the process. One of these shows the testing plant as a whole and the other shows the regulating device. The hot compressed air enters the test apparatus from the small pipe at the left and passes in succession through the three large pipes. In each of the large pipes are sprays of water and in each is an eliminator for removing the entrained moisture. The cooled air leaves the cooling pipe in a small pipe at the right side of the picture, while the water used for cooling is drained from the bottom of the pipes. The small pipe carrying the out-flowing cooled supply of compressed air is hung underneath a steam line, so that, for the purposes of the test, the temperature of the air may be raised to evaporate any entrained moisture which might still remain in the air. If such water were not evaporated, the presence of it might not be indicated by the dry and wet bulb thermometers employed for the determination of the moisture remaining in the treated air. The pair of thermometers near the right side of the picture are the wet and dry bulb thermometers, placed so that at pleasure

the cooled air may be discharged across them. A gate valve marked A is used to control the pressure of the air in the cooling pipe as may be desired for the purposes of the test.

A differential gauge, mounted on the door, has shown that the loss of air pressure in passing through the apparatus, is small.

The regulating device is an invention patented by Messrs. Lyle & Murphy and is designed to control the temperature of the water by means of a mixing valve so that the temperature of the air as it leaves the apparatus shall have a definite relation to the pressure of the air. On this basis the moisture content per pound of the dried air is kept constant. Mr. Miles states that remarkable accuracy has been shown by this device, and he considers himself fortunate in having found so satisfactory an apparatus to give the temperature control which is an essential feature of his process.

The accompanying table of figures taken in a test on May 2, will be illuminating with regard to the efficacy of the process and the control. In column 1 are given the times of observations, which, it will be noticed, were taken substantially at 5 min. intervals. In column 2 is given the pressure of the air in the piping. Columns 3, 4 and 5 give the temperatures of the entering, intermediate and leaving air, taken by the thermometers shown in the photograph.

Test of Dried Blast Process Cooling Air After Compression.

1	2	3	4	5	6	7	8	9
Time.	Pressure Air.	T1	T2	T3	Grains, per cu. ft.	T4	T5	Grains, per cu. ft.
2.00								
2.15	23.75	148	62	53	1.8	51.2	72.2	1.63
2.20	23	145	62	53	1.82	51.2	72.4	1.62
2.25	23.25	138	62	52	1.78	51.6	72.6	1.70
2.30	21	130	58	51	1.8	51.2	73	1.57
2.35	21	128	57	51	1.8	51.4	73.4	1.61
2.42	19	..	..	50.5	1.82	51.5	72.8	1.70
2.45	19.25	128	53.5	49.5	1.78	50.8	73	1.53
2.50	19.75	..	..	49.5	1.77	51.5	72.6	1.71
2.57	20.25	124	54	50.75	1.82	51.2	72	1.70
2.56	20.5	..	..	51.5	1.84	51.1	71.6	1.70
3.00	20.25	122	53	50	1.78	50.2	71	1.55
3.03	20	..	..	50.5	1.8	50.6	70.6	1.7
3.8	20.5	120	54	51.5	1.85	51	70.4	1.83

It will be noted that under the influence of the controlling device temperature T5 changes automatically to meet the changes of pressure in column 2.

In column 6 are given the grains of moisture per cubic foot, as of free air, at 28 deg., corresponding to 1 1/4 grains per cubic foot, at which the controlling device was set, calculated from the pressures in column 2 and temperatures in column 5.

Columns 7, 8 and 9 give the wet and dry bulb and the moisture content of the air after it has left the apparatus. In general, these observed moisture contents are less than the calculated, of column 6, as they should be since the calculations are made for 28 degree air, while the air where the observed contents were gotten is above 70 deg. The close control is indicated by the readings of column 6 which give more accurately the moisture content than do those of column 9, since the latter are dependent upon the readings of the dry and wet bulb thermometers which are rarely continuously consistent.

It should be added that Mr. Miles has been authorized by James Gayley to install in the United States the process under the Gayley patents and his own.

City Housing Problems to Be Considered.—In response to a wide demand, the National Housing Association will hold the first national conference on housing in America in New York, June 3, 5 and 6. The discussions will be of much interest, as is evidenced by the following subjects, which are a few of those to be considered: "Problems of the Small House," "Sanitary Inspection," "Housing Reform Through Legislation," "Best Types of Small Houses," "City Planning." So many speakers, coming from so many states, near and remote, will take part in leading the discussions that the conference will be practically a national one. The sessions will be held in the assembly hall of the United Charities Building, 105 East Twenty-second street (corner of Fourth avenue), New York, and all persons interested in housing reform are invited to attend.

The Nelson Valve Company's New Works

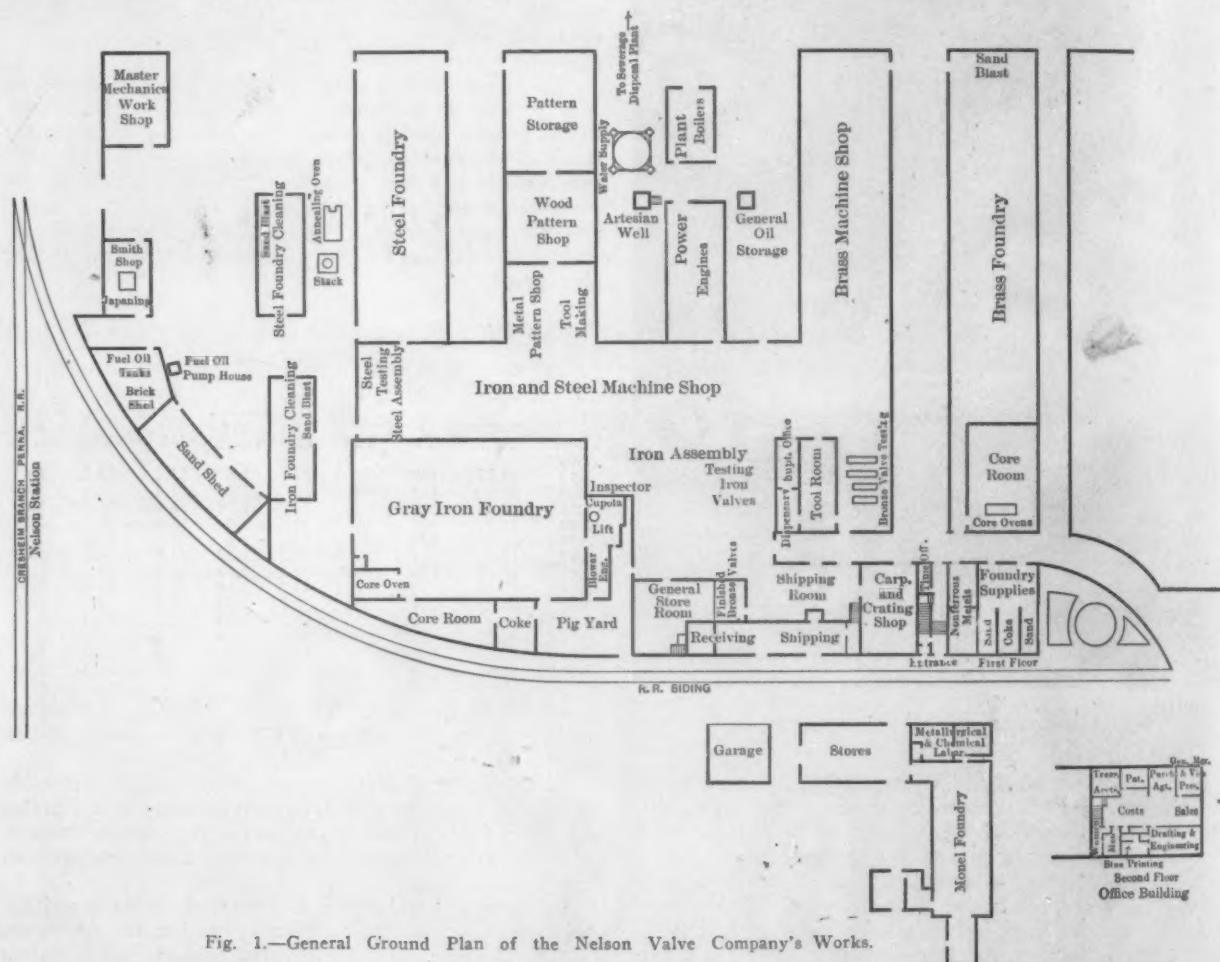
An Ultra-Modern Plant for the Manufacture of Large and Small Valves of Iron, Steel and Bronze

The new works of the Nelson Valve Company, Philadelphia, Pa., afford a striking example of the advances which are being made each year in machine shop and foundry design. The illustrations reveal many interesting details of modern equipment and construction.

The plant is located at Nelson Station, in Wyndmoor,

With the exception of the gray iron foundry and a few minor buildings everything is new. The 15 acres of ground will provide opportunity for other expansion in the future.

The Nelson Valve Company manufactures steel, bronze and iron valves of various types, including gate, globe,



near Chestnut Hill, on the Cresheim branch of the Pennsylvania Railroad. The original works were established on the same site, in 1896. Increased business compelled additions from time to time, which repeatedly were found inadequate, and it was finally decided to erect an extensive fireproof plant providing not only a multiplied capacity but also an open hearth steel foundry for the superheated steam valve department. Construction began about two years ago and now represents a total area of 110,556 sq. ft.

angle and check valves, for water, air and steam. They are designed for all pressures and temperatures, in sizes from $\frac{1}{8}$ in. in bronze to 36 in. diameter in iron or steel. The new buildings are of concrete and steel construction, with roofs of concrete slabs covered with the American Cement & Tile Company's Bonanza tile. The fireproofing

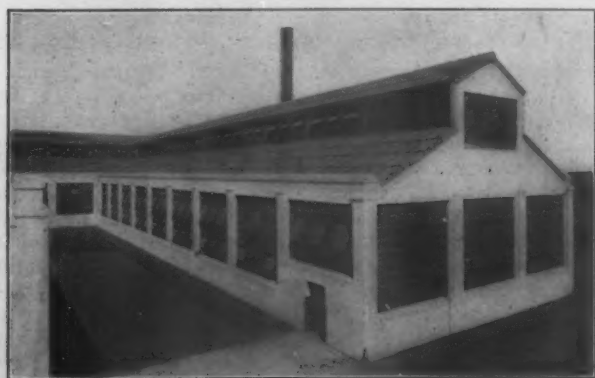


Fig. 2.—The Steel Foundry, Showing Details of Construction, Lighting and Ventilating.



Fig. 3.—The Power Plant.



Fig. 4.—The Non-Ferrous Metal Storage.

is complete. Much attention has been given to the natural lighting and ventilation of the buildings, the windows totaling 40,000 sq. ft. An average of 49 per cent of the side wall space is of glass, with all exposed portions of wired glass. The windows, including the roof lanterns, are set in Detroit-Fenestra patented steel sash, furnished by the Detroit Steel Products Company, Detroit, Mich. The open sections which will provide ventilation are operated by Hitchins & Co.'s and Lord & Burnham's opening devices. In places where additional overhead day light is required, as at the junction of two roofs, where side wall

windows are not available, wired glass skylights, 13 x 24 in., are let into the concrete slabs.

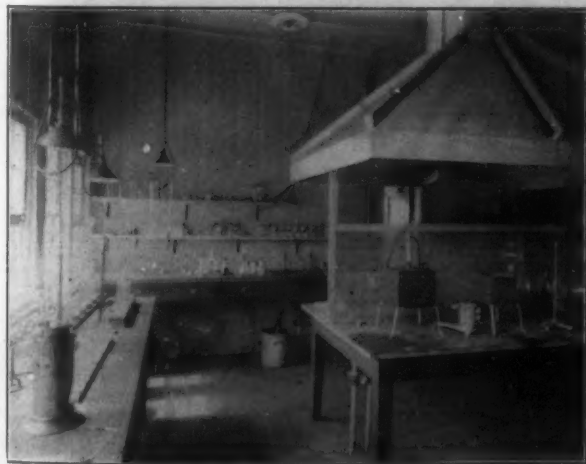
The arrangement of the plant is shown in the accompanying ground plan, Fig. 1. The general construction of the buildings consists of steel frame and reinforced concrete. The principal structures are 20 ft. high at the top of the side walls and 40 ft. at the peak of the roof. The roofs are carried by steel trusses. The tiles, which are reinforced with woven wire, are 24 in. wide by 48 in. long and 1 in. thick, a ridge lapping over one side. They are treated especially to make them impervious to moisture.

This type of construction is more clearly shown in Fig. 2, which is a view of the exterior of the new steel foundry. The skylights let into the roof of the adjoining shop will be noted where the foundry joins that building. The relative proportion of the steel window area to the side wall space and the general ventilating scheme in connection with the windows are graphically revealed. The same general plan is followed in practically all the other buildings. The plant was designed by Carlisle Mason, and George K. Hooper was the architect.

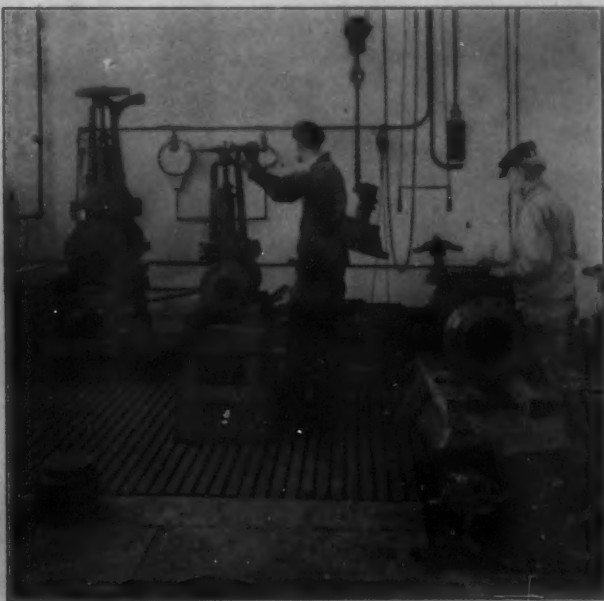
The Power Plant

The power house, located practically in the centre of the plant, is of concrete, 32 by 72 ft. This building, Fig. 3, houses three General Electric 250 volt direct current generators, directly connected with centre crank Ideal engines. An air compressor installation supplies compressed air to all parts of the plant. Hydraulic pressure pumps, feed water heaters and other appliances are located in a pit in this building. The extensive electric switchboard is shown at the right of the generators. The steam plant is at the rear of the power plant and is now being augmented with 500 h. p. additional boiler capacity. The machinery throughout the plant is belt driven from line shafts, each with its own motor, which transmits power through a Morse silent chain.

Convenience as well as economy in handling raw mate-



The Chemical Laboratory.



The Valve Testing Room.



The Testing Machine.



The Metallurgical Laboratory.

Fig. 5.—A Group of Views in the Laboratories.



Fig. 6.—The Bronze Foundry Core Room.

rials for use in the various departments of the plant has been given close attention. Storage bins are located at one end of the plant, which are filled direct from a railroad siding extending along its length. The bins are conveniently located for easy access to the different departments. In the majority of instances the bins are under cover. The coke bin has a capacity of 60 tons, while the sand bins store 100 tons each.

In Fig. 4 are shown the storage facilities for non-ferrous metals. Here the charges for the bronze melting furnaces are mixed and conveyed by trucks to the melting department. The storage capacity is 500,000 lb. of metal, large stocks of copper, tin, spelter and lead being maintained. Steel bins for the storage of scrap from the company's own foundry are also located in this department.

All materials used in the manufacture of valves by the company are carefully analyzed and tested. A chemical and microscopical laboratory, equipped with apparatus of the latest type, has been installed, while a physical laboratory, containing a Riehle 100,000-lb. testing machine, determines the physical character of the metals. The laboratory has become an absolute necessity owing to the increased practice of chemical and physical specifications in connection with the various types of valves. Fig. 5 gives several views in this department.

The pattern-making department is an important one.



Fig. 8.—The Overhead Tramway System.

The wood pattern shop measures 48 x 48 ft., is lighted from the exterior by full side wall steel sash, wired glass

windows and by the roof lanterns. It is divided by fireproof partitions from the metal pattern and tool-making departments and that for pattern storage. All master patterns are made of mahogany. Adjoining the wood pattern shop are the metal pattern and tool-making departments. In the latter are located the precision tools. In addition to the machine work on metal patterns various tools for the company's use in the machine shops are made in this department, particular accuracy being required in order to have the various valve parts not only perfectly accurate, but also interchangeable. At the opposite end of the pattern shop is the pattern storage which occupies a portion of the building, covering 48 x 64 ft. Here the master patterns and others are stored on special adjustable steel racks, manufactured by Merritt & Co., Camden, N. J. Each rack is 42 ft. long, 6 ft. wide and 17 ft. 6 in. high. The shelves are 3 ft. by 4 ft. 8 in. and are easily adjusted to any height by means of a supporting device let into sockets which are spaced a few inches apart in the upright tubular frames. The high shelves are reached from a rolling ladder. The wide expanse of windows renders this department extremely light, a feature unusual in general pattern storage practice.

The Bronze Foundry

The general layout of the bronze foundry, which covers a total floor space of 9813 sq. ft., embraces the core mak-



Fig. 7.—Interior of the Bronze Foundry.

ing, melting, molding and cleaning departments. The core making department, Fig. 6, is located at one end, occupying a space of 36 x 56 ft. Here the cores for the bronze foundry are made under a piece work system, girls being extensively used for this task. All the tables and stools are of steel and may be moved to any position. Steel racks for drying and storing cores are provided, with a capacity of from 1500 to 1600 trays. A battery of four Millet core ovens is used for baking the cores, while a supplementary oven at the rear of these anneals the crucibles for the bronze melting furnaces. The crucibles are given a preliminary seasoning by storage over the ovens, where the waste heat serves to remove some of the contained moisture. A Hanna core-making machine is employed for making certain classes of cores, while a Gregg wire cutting machine cuts the wire required for the cores. Sand for the manufacture of the cores is carried by means of trucks from nearby bins.

The melting department, Fig. 7, includes a battery of six M. R. V. tilting furnaces, installed by J. B. Wise, Watertown, N. Y. Coke is used as fuel and artificial draft is supplied by a Sturtevant blower. The fumes are carried through hoods to a natural draft ventilator in the roof. The metal is fed to the crucibles through hoppers on the furnaces. The total melting capacity of the battery is 40,000 lb. per day, on double turn. The metal is carried from the furnaces in ladles which have been preheated in an oil fuel heating furnace, and is then carried by means of an extensive system of overhead tramways, Fig. 8, installed by the Coburn Trolley Track Mfg. Company, Holyoke, Mass., to various parts of the molding floor. In this foundry Berkshire automatic and Mumford and Tabor split pattern power squeezer molding machines are used in addition to the usual bench work. The entire floor of the foundry is of concrete, specially laid for heavy service. On the molding floors steel angle irons, $2\frac{1}{4}$ by $2\frac{1}{4}$ in., are laid across the



Fig. 10.—The Bronze Valve Testing Department.



Fig. 9.—The Bronze Machine Shop.

floors, on which one end of the molds is set to give them the proper angle for pouring.



Fig. 11.—Interior of the Steel Foundry.

are placed, according to size and character, in steel tote boxes which are carried by trucks to the bronze machine department, Fig. 9. Here the different parts, such as bonnets, bodies, etc., are delivered to the various machine tools. The equipment is made up largely of small turret and automatic machines, which are fitted with air controlled chucks that grip and release the work without the stopping of the machines, except for certain operations. All the belts on the machines in this department are equipped with a quick change pneumatic belt shifter, which greatly facilitates the work of the operator. Between each pair of machines, which are arranged in five rows extending the length of the shop, is a movable steel screen, which intercepts flying chips.

Methods of Handling the Work

After the parts are finished they are carried in tote boxes on trucks to a steel storage rack, where they are kept as stock, each box being labeled to designate the contents, which are also systematically grouped in the racks. The racks have a storage capacity of 1250 boxes. Adjacent to the racks is the assembling department, where the work of assembling the bronze valves is done. Pneumatic vises are used for this work. Here also are counted the valves and parts, an automatic weighing and counting machine being used. In this department is a magnetic separating machine, requiring little attention, which separates the bronze chips from other material, the clean metal being used as scrap in the melting furnaces.

After inspection the valves go to the bronze valve testing department, Fig. 10, where every valve is tested, each being subjected to a hydrostatic pressure of more than twice the rated pressure resistance. Locked recording gauges show the pressure on the various testing tanks, which insures a constant pressure and reaches a maximum of 1000 lb. to the square inch for certain classes of valves. Both sides of the closed valve, as well as the valve bonnet, are tested and any weak point or defect is brought out. The testing tanks, as well as the racks for storing tested valves, are of sheet steel. After testing, the bronze valves are

At the rear of the foundry is a sand blast cleaning and assorting room, where the castings, after being inspected,

stamped with the inspector's initial, wrapped in anti-tarnish tissue paper, then in heavy wrappers and are

labeled and stored in steel bins, which, for this class of work, provide storage of 1820 lb. of bronze valves to each bin. The floor space occupied by this group of departments aggregates 13,000 sq. ft.

The Gray Iron Foundry

The one remaining main structure of the old plant, the gray iron foundry, is of partly steel covered frame, partly brick, 96 x 132 ft. The raw material supply is from storage bins located along the adjacent railroad track. Pig iron and scrap are supplied to the cupola and sand to the molding floors by industrial railway. A steel jib crane



Fig. 12.—A Special Annealing Oven.

serves the main foundry floor, on which the heavy floor work is done. In a bay, on the side, molding machines are located, including Mumford and Tabor split $\frac{1}{4}$ pattern power ramming machines, together with Herman and Pridmore machines, all served by three one-ton overhead electric hoist, hand power traveling cranes. A Whiting cupola furnishes the metal for this foundry. The core making department is located adjacent to the foundry building.

The Steel Foundry

The steel foundry, Figs. 1, 2 and 11, occupies a floor space of 6912 sq. ft., the building being 48 x 144 ft. in general dimensions. A four-ton acid open hearth furnace, using oil fuel, is located at one end of the building and adjacent to it are the ovens for drying the molds. Industrial railways, operating over floor scales, serve for the carrying and weighing of raw materials going from the storage sheds to the open hearth furnace. Steel castings for valves up to 36 in. in diameter are made here. A five-ton Case electric crane serves the molding floor and is used as well for pouring the steel. In addition to the opening sash in the side windows, of which there are two rows, ventilation is obtained by opening the windows in the lantern of the roof.

After being knocked out the castings are transferred to the chipping and cleaning room, a building 24 by 66 ft., adjacent to the factory. Here are cold saw cutting-off machines, shapers, power hack saws and pneumatic chipping hammers, where the heads, gates, fins and sand are removed from the castings. A small hand power jib crane serves the various tools and facilitates the handling of the castings. An annealing oven with a removable top, Fig. 12, using oil fuel, which is located in the open air between the steel foundry and the cleaning room, is used for the further heat treatment of the steel valve parts. It is served by an overhead electric lift.

The General Machine Shop

While the absence of woodwork is noticeable in all the departments of the plant, it is particularly so in the general iron and steel machine shop, which covers a total space of 12,220 sq. ft. The assortment of tools includes almost the entire range of metal working machinery in varied sizes. The grouping facilitates the work to be performed.

All the machines are belt-driven from an overhead line shaft, which is carried on adjustable iron plates, fastened to channel irons, that are bolted to the roof girders. There are three main lines of shafting each,

driven by a General Electric motor with Morse silent chain drive. Each line of shafting is connected at the centre by a friction clutch, so that any one of the individual sections of the shop may be operated or stopped independent of the others. An overhead iron walkway provides easy access to any portion of the overhead power equipment.

For handling material in this shop two 2-ton overhead electric traveling cranes of 14 ft. span have access to the machines which operate on the heavier classes of work. Hand power jib cranes handle the lighter castings. As some portions of the machine shop are not adequately lighted by the usual side windows, additional illumination is obtained from skylights and by inserting wired glass into the concrete roof slabs, as previously described. In this department the workmen's tool benches are of steel, with locked steel drawers, each man having his individual key, differing from all the others, but a master key remains in the possession of the foreman. An industrial railway system brings castings from both the gray iron and steel foundries. Ball-bearing trucks are also used to carry the smaller class of work from one point to another. Tool room facilities are provided in a space adjacent to both the bronze and general machine shops, the department following the usual plan of arrangement and equipment.

Adjoining the machine shop is the department for assembling and testing the larger valves, Fig. 13. As no side light was available, the extreme brightness from the overhead skylights and wire glass inserts in the roof is worthy of note. After assembling and inspection, the larger valves are given the same rigid tests as are the smaller, the hydrostatic pressure being run up to 1000 lb. when the working pressure is but 400 lb. Special arrangements for testing steel valves are provided. They must in some cases withstand a working pressure as well as a superheated steam temperature and are tested considerably above their rating to insure a full factor of safety. After having been thoroughly inspected and tested the valves are taken to the store room and thence to the shipping room. The shipping platform, which is reached by an elevator, is at the level of the floors of steam railroad cars.

An interesting task in connection with the jacking of the hand wheels of the larger valves is performed in a separate building. The wheels, after being dipped and air dried, are placed in special ovens for baking the japan, one of which is shown in Fig. 14. These ovens have three doors, swung on a central pivot, each being a single steel sheet, 54 by 96 in., on each side of which are racks on which the hand wheels are hung. The simple revolution of the steel door bring the green wheels into the fire chamber and the baked wheels to the outside, where the

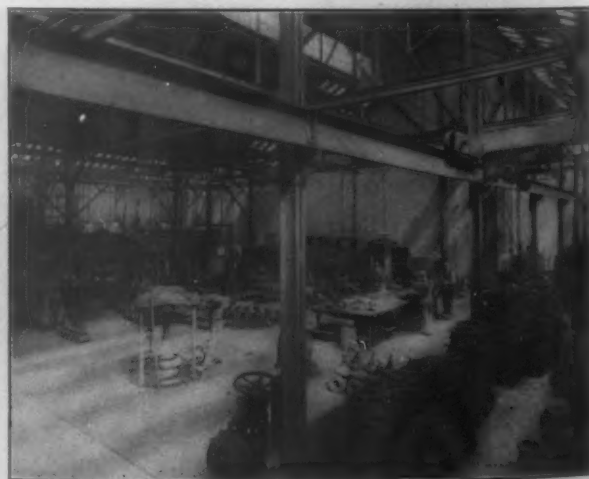


Fig. 13.—Assembling and Testing Large Valves.

latter are cooled in the open air and readily removed. Oil fuel is used in these ovens.

While the system of day lighting of all departments of the plant by side wall windows is elaborate, that for night lighting has not been overlooked. In the main portions of the mechanical plant, flaming arc lamps, particularly those of the Adams Bagnall and General Electric types, are used. In certain portions where this style of

lighting is not adaptable incandescent electric lamps in sufficient number and power provide illumination.

In addition to insuring mechanical facilities of the most modern character in its various departments, the Nelson Valve Company has not overlooked the comforts of its employees. Approved toilet arrangements have been provided in each department, while sanitary drinking fountains provide water. A sewage disposal plant, with a capacity of 15,000 gal. in 24 hours, has been built to take care of the sewage from the plant.

An emergency hospital and dispensary, Fig. 15, in charge of a competent physician, who is in daily attendance, attends to slight wounds and injuries and gives medical treatment to employees. All treatment is free.

The various buildings of the plant are heated by hot air drawn from the outside atmosphere, passed over steam coils and forced through a main trunk line of galvanized iron pipe 42 in. in diameter, located in the centre of each building and bay at the height of the side walls. The pipe is reduced at distant points to 12 in. in diameter. A constant circulation of pure warm air is maintained in winter, while in hot weather the system is used for the circulation of air at ordinary temperature, maintaining a normal supply of fresh air.

As a means of fire protection, notwithstanding the fact that the buildings are for the most part thoroughly fire-proof, a water tank 80 ft. high, with a capacity of 25,000 gal. and with distributing mains through the different parts of the works, is an additional safeguard. The local fire department of Wyndmoor is located about 300 ft. from the plant.

The employees on the rolls of the company now number from 450 to 500.

The office is located on the second floor of a building at the northern corner of the plant, easy of access to the railroad station and on the main street. Here are the headquarters of the officers of the company, the general offices, purchasing, patent and drawing and engineering departments, all in commodious quarters. In the latter department a mammoth blackboard is used on which full size drawings of the larger valves can be laid out in exact detail. An electric blue print room is an adjunct of this department. In the general manager's office is located a



Fig. 15.—The Emergency Hospital.

Hahl pneumatic master clock controlling all the clocks in the plant. Loose leaf and card record systems are used extensively in the conduct of the company's business, while a modified system of scientific shop management has been adopted to serve the needs of certain departmental work. The employees' entrance and paymaster's office are directly below the general office. Every workman records his ingoing and outgoing time by recording clocks and proceeds to the main court at the rear of the office building, from which access to all departments of the plant is to be had.

The American Institute of Mining Engineers to Change Its Name

The council and the board of directors of the American Institute of Mining Engineers have decided to recommend a change of its name to "American Institute of Mining and Metallurgy." This proposal will be submitted to the entire membership for ballot. The idea in making the change is that the proposed name more broadly represents what the organization stands for, the present name being to a large extent a misnomer.

The council and board of directors have also decided to commit the Institute to the policy of establishing local sections, in order to afford means for frequent meetings in many parts of the United States. Applications for the organization of local sections have already been received from members in San Francisco and in New York, and the formation of sections at those places has been authorized.

"Manganese Steel and Its Application in the Ceramic Industries" was the subject of a paper read before the twenty-fifth annual convention of the National Brick Manufacturers' Association at Louisville, Ky., by G. W. Kneisley of the Edgar Allen American Manganese Steel Company, McCormick Bldg., Chicago, Ill. The paper has been reprinted in handy form and can probably be had on application to the company's general offices or the Eastern sales office, New Castle, Del. It reviews the development of the use of ferro-manganese and discusses the experience with manganese gears, crushing rolls and the like in clay-working machinery.

The United States Naval Experimental Station at Annapolis has requested the George M. Newhall Engineering Company, 136 South Fourth street, Philadelphia, Pa., to furnish its high and low pressure Vance steam traps for a series of tests. The Boston & Maine Railroad is also making a test with a high pressure Vance steam trap to work under superheat. The outcome of this test is being watched with interest by the engineering profession. The company has further been requested to furnish one of its Vance steam traps for demonstration before the classes at Annapolis Academy.

Frank Samuel, Philadelphia, Pa., has purchased the rolling mill equipment of the late Bristol Iron & Steel Company, Bristol, Pa., and will offer it for sale, dismantling the plant.

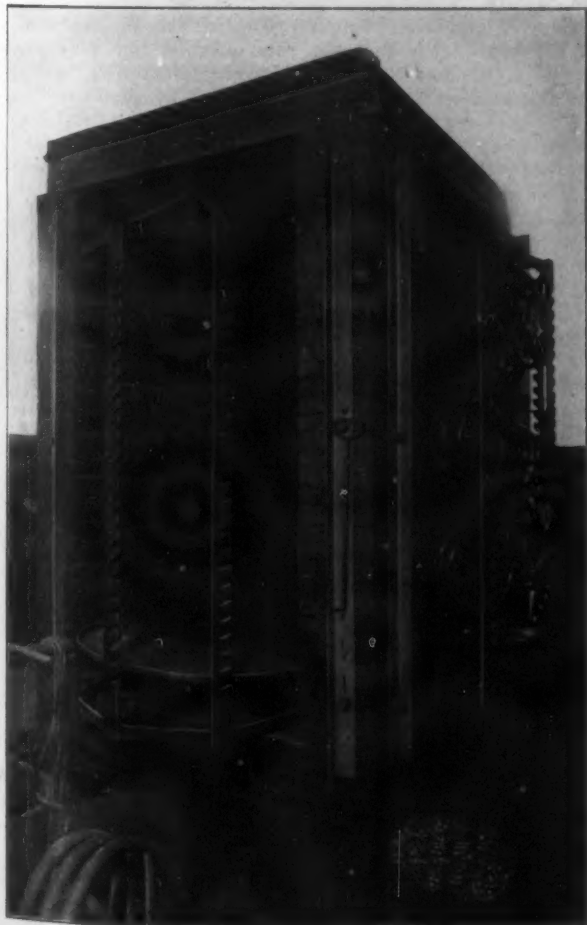
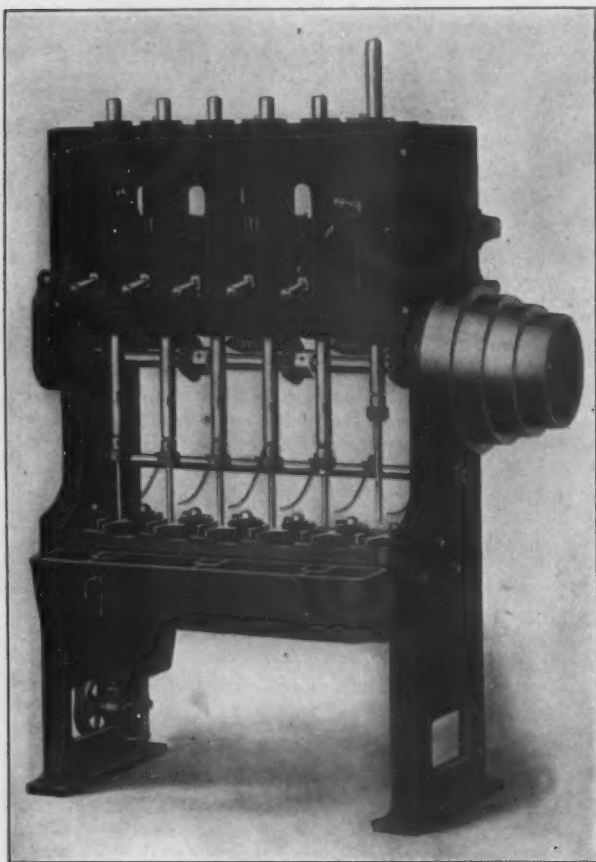


Fig. 14.—A Special Oven for Baking Japan.

Semi-Automatic Nut Tapper

A new design of semi-automatic nut tapping machine has been recently placed on the market by the National Machinery Company, Tiffin, Ohio. Some of the special features of the new machine are the ability to tap rough hot pressed nuts as rapidly as cold punched ones, an increased output due to the automatic raising and lowering of the tap spindles and long life of the taps.

It is claimed that in this new machine the objections frequently raised against an entirely automatic tapper on account of the hot pressed nuts sticking because of small burrs has been entirely overcome. The taps are raised and lowered automatically by six three-step cams carried on a horizontal shaft in the rear of the spindle housing, and the number of revolutions of the tap spindles for raising and lowering can be varied to correspond with the number of threads on the tap being used. In this way the non-productive tapping, time that is the interval in which the tap is running idle in the nut after the operation has been com-



A New Semi-Automatic Nut Tapper Built by the National Machinery Company, Tiffin, Ohio.

pleted, is eliminated and in this way it is possible to secure outputs ranging from 60 to 80 per cent. more than are possible on a tapper of the foot-lever type. This arrangement causes the machine to set the pace for feeding and the operator, it is stated, is not as easily fatigued as when operating a foot-lever tapper where a treadle has to be pressed for each operation. In this way he can keep pace easily with the machine throughout the entire day. The cam for raising and lowering the spindles engages with hardened steel rolls carried in the spindle levers. The horizontal cam shaft on which these cams are mounted shifts laterally to engage the various cam faces, and this arrangement enables the time during which the cam is kept idle in the raised position to be altered to meet the needs of the operator for feeding the machine and emptying the taps. The speed variation of the tap spindles to correspond to the number of threads on the tap employed is secured through a quick change speed box on the cam shaft which is operated by a single lever.

As compared with the foot-lever tapper longer tap life is secured. This is made possible by the cam movement which causes the tap to be lowered gradually instead of dropping into the hole with the weight of the spindle back

of it, which is the common arrangement of the foot-operated machine and causes the tap to bind and frequently break or have the threads stripped off. The equipment of the machine includes an automatic socket whereby the tap can be removed or inserted while the machine is running and the tap automatically ejected when the shank becomes filled with tapped nuts.

Two sizes of tapper are built, one with six spindles for tapping 1-in. nuts and the other which can tap 1½-in. nuts with ten spindles.

Customs Decisions

Lawn Mowers

The importation into this country of lawn mowers from England is likely to be given added impetus under the present tariff by a decision just handed down by the Board of United States General Appraisers. The decision holds that lawn mowers are more aptly described as "mowers," under paragraph 476 of the tariff act of 1909, than as "manufactured articles of metal not specially provided for" under paragraph 199. It is held by the board that the term "mowers" is used in the act to designate the implement used by gardeners as well as the large machine used by grain harvesters.

The result of this view of the law is to grant free entry to lawn mowers imported from England. The government's contention was for duty at the rate of 45 per cent. C. H. Langley and Patterson, Wyld & Co., the importers, alleged free entry for the machines by virtue of the proviso to paragraph 476, which exempts from duty mowers when imported from any country imposing no tax or duty on like articles imported from the United States. Counsel for the government insisted at the hearings that the provisions of paragraph 476 apply only to articles in the nature of agricultural implements, and that as the articles before the board are used by gardeners on lawns and not in husbandry, they are to be excluded from paragraph 476, not being of the character of the machines as therein provided. It was not disputed that the mowers in controversy are of English origin, and that England, the country from which they are imported, imposes no tax or duty on such mowers from this country.

General Appraiser Fischer, who writes the decision for the board, says that the only question that must be decided is whether the term "mowers" is used to designate the smallest kind of a mower used by gardeners as well as the large machine used by grain harvesters for cutting grain or clover. He reaches the conclusion that both varieties are known as "mowers" and are such in common parlance. After quoting the dictionaries, the decision says: "It would appear, therefore, if only such mowers as are agricultural implements are included within the meaning of the term mowers as used in paragraph 476, the lawn mower would still be within that class according to the lexicographical meaning of the terms as quoted. But we believe that the question goes beyond this, and that the provision reading 'mowers' without words of limitation includes all kinds of mowers, whether for use on the farm, garden or lawn. The protests are accordingly sustained."

Engravers' Printing Presses

The board, in sustaining a protest filed by Lunham & Moore, has decided that presses used in printing from engraved plates or dies are properly entitled to classification as "printing presses" with duty at the rate of 30 per cent. The government alleged that the presses in question are not the kind contemplated in the provision for "printing presses." Classification was therefore imposed as "manufactures of metal not specially provided for," with duty at 45 per cent. on the value. In reversing the government, General Appraiser Fischer says that the proof offered shows that the importers' claim in these cases is well founded. The presses perform the ordinary work of printing with ink from dies and plates.

Henry Braun & Co., Pittsburgh, dealers in iron and steel scrap, have purchased the plant of the Keystone Axle Company, Beaver Falls, Pa., built some years ago for rolling car axles, but which has been idle for some time, and will remove the equipment to Pittsburgh.

The American High Duty Lathe

A New Type with Interesting Features—The Various Styles of Heads Include an Electric Driven All Geared Design

The 30-in. high duty engine lathes, shown in the illustrations, are a new design brought out by the American Tool Works Company, Cincinnati, Ohio. The machine is built with several styles of heads, namely, the 12-speed, patented geared head for belt or motor drive; the 12-speed

wide range of work. The step diameters are large, and the face wide, providing ample belt contact. A triple geared headstock, illustrated in Fig. 3, gives 12 spindle speeds and transmits great power. The cone pulley has four steps with 5 5/16-in. faces of large diameter. The

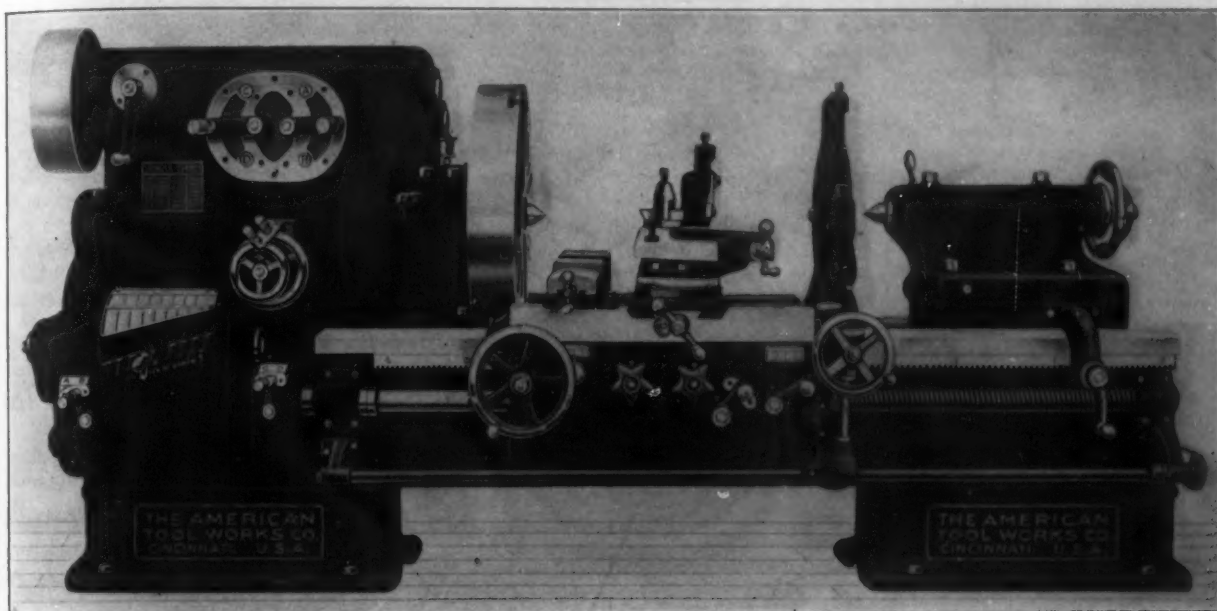


Fig. 1.—The 30-In. High-Duty Lathe with Belt Drive and 12-Speed Head, Built by the American Tool Works Company, Cincinnati.

triple geared head, cone pulley drive; 9-speed, double back geared head; and the 8-speed, single back geared, cone pulley drive. The quick change gear mechanism is of a new construction.

The machine is massive in design, to withstand the strains imposed by its great power.

A feature of the patented head is the method of motor application, by which a belt-driven geared head lathe can be converted into a motor drive, after its installation, by simply applying a motor on the top of the head, which is a flat surface, as shown in Fig. 2. Three gears only are required in connecting the armature and the main driving shaft. A constant speed motor, of either the direct or alternating current type, is used. The 12 fundamental spindle speeds range from 6 to 275, the number of gears required to accomplish this having been reduced to 14, with a maximum gear ratio of 56-6 to 1. The motor is under constant control through the controller hand wheel, located on the right end of the carriage, a dial indicating the speed. The speed changes are made from the lever and hand-wheel on the front of the headstock. The motor speed can be comparatively high, from 1,000 to 1,200 r. p. m., which, of course, keeps down the size and the initial cost.

A powerful but sensitive friction clutch is placed on the driving gear for starting, stopping or slightly moving the gears in the head, to facilitate speed changes without shock to the mechanism or interference with the motor speed. The size of the motor may be varied according to the nature of the work to be handled. If the lathe is to stand up to continuous hard work, from 7½ to 15 hp. is recommended.

In cutting the steel tumbler gears, Brown & Sharpe 20-deg. involute cutters are used, which produce a tooth pointed at the top and unusually wide at the base. This form is deemed excellent practice in tumbler gear mechanism, as it greatly facilitates the meshing of the gears when running at high speed and eliminates the tendency of the gears to ride.

The double, back geared headstock shown in Fig. 5 has nine spindle speeds: Three direct, three reduced and three double reduced speeds, covering the demands of a

large degree of belt contact combines with the extra high gear ratios to secure power for any work within the range of the machine. The triple gears are of the slip gear type and are readily engaged by a rack and pinion at the front of the head through the manipulation of the hand wheel, which also automatically engages the direct drive to the spindle when the face plate pinion is withdrawn. The internal gear is planed integral with the

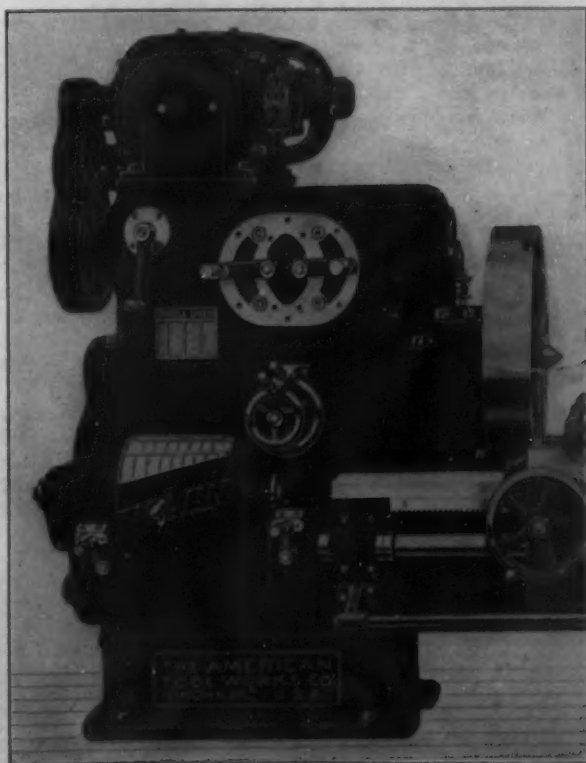


Fig. 12.—The 12-Speed Head Lathe with Motor Drive.

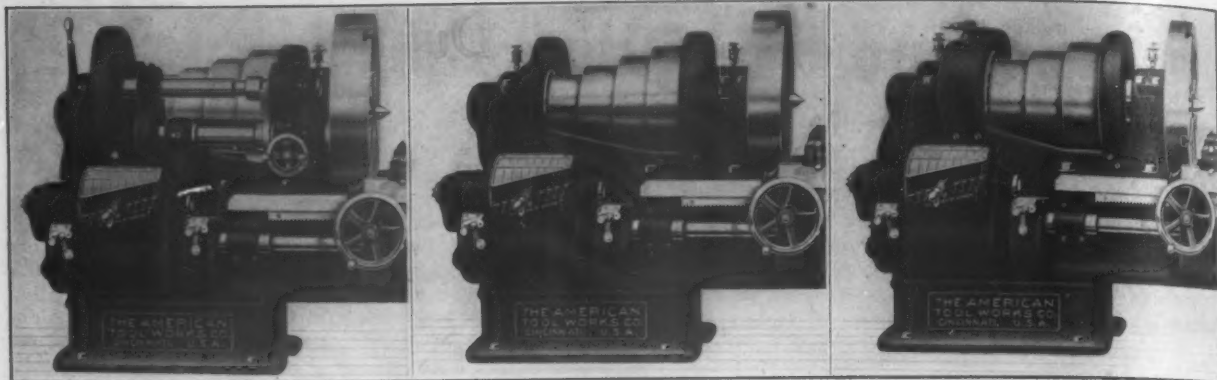


Fig. 3—The Four-Step Cone Pulley Triple Geared Head. Fig. 4—The Four-Step Cone Pulley Single Back Geared Head. Fig. 5—The Three Step Cone Pulley Double Back Geared Head. Various Types of Heads with which These Lathes Can Be Equipped.

face plate and the pinion is cut solid with the shaft. All the driving gears are of coarse pitch with wide faces.

The single back geared headstock, Fig. 4, has eight spindle speeds, and is designed for a medium class of work. There are four direct speeds and four reduced spindle speeds. In all the heads the shafts are of high grade steel, accurately ground and the bearings are bushed with phosphor bronze. The spindle bearings have sight feed oilers.

The two sizes are essentially alike excepting in their swing, the specifications being practically identical. The 30-in. swings $32\frac{1}{2}$ in. over the wings of the carriage, and $22\frac{3}{4}$ in. over the carriage bridge. The 36-in. swings $36\frac{1}{2}$ in. over the wings of the carriage and $28\frac{1}{4}$ in. over the carriage bridge. The reduction in the number of running parts increases the efficiency of the drive, and this, coupled with the system of lubrication, delivers a high percentage of power to the tool.

Among the characteristics of the quick change gear mechanism is the use of all steel gears. A practically unlimited range of changes for feeding and screw cutting is provided, 48 standard changes being shown on the index plate, listing threads from $\frac{1}{2}$ to 28 per inch, including $11\frac{1}{2}$ pipe threads, and feeds from 5 to 280 cuts per inch. The quick change unit furnishes 32 fundamental changes, which combine with an auxiliary quadrant and a pair of compound gears on the end of the bed. This arrangement makes it possible to obtain easily special threads and feeds. Metric pitches are obtained through the English lead screw and transposing gears. The rate of feed is 10 times the number of threads at the same setting. The feed box is a complete unit, embodying what is usually carried in two sections. It consists of a gear box on the front of the bed with two levers and a steel sliding tumbler, the latter working in conjunction with a cone of eight steel gears.

The carriage of the machine is very heavy, particularly in the bridge, which is especially deep, due to the double V bed. It has full continuous bearings of 44 in. on the V's. It is gibbed its full length on the back, and a clamp is provided on each end at the front, that at the right being used for binding to the bed. The lead screw is $2\frac{1}{4}$ in. in diameter and is chased 1 thread per inch, permitting the engagement of half-nuts at any point, without the use of the thread dial, except when fractional threads are desired. It is made from high carbon, ground stock, chased from a Brown & Sharpe master screw. The tail-stock is of the quadruple clamping stud type with back bolts running to the top of the barrel for convenience in clamping, and is further secured against movement by a pawl dropped into a rack cast into the center of the bed, an especially valuable feature when heavy work is being done. The pawl may be lifted out of engagement by a pull-rod at the end of the tail-stock.

The specifications are as follows:

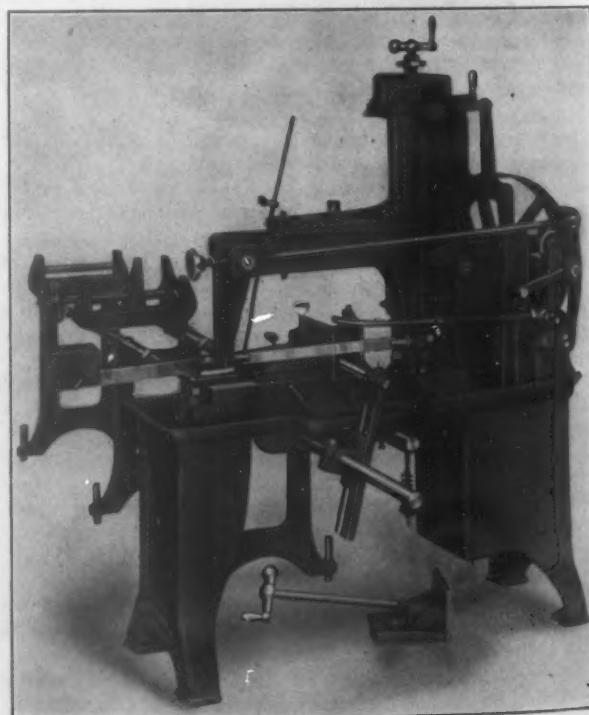
Standard length of bed, ft.	10
Distance between centers with tailstock flush geared head, in.	51
Distance between centers with tailstock flush cone pulley head, in.	45
Diameter of hole through spindle, in.	$2\frac{9}{16}$
Section of tool steel used, in.	1×2
Morse taper of centers.	No. 5
Feed to top side of compound rest, in.	$\frac{9}{16}$
Diameter of driving pulley geared head, in.	18
Speed of driving pulley geared head, r.p.m.	340
Width of driving belt geared head, in.	6
Width of driving belt cone pulley head, in.	$5\frac{1}{4}$
Diameter of smallest cone pulley step, in.	$10\frac{5}{16}$
Diameter of largest cone pulley step, in.	$20\frac{1}{4}$

The equipment regularly furnished includes compound,

steady, follow and full swing rests; a thread dial, a countershaft for the belt-driven tools and a full set of wrenches. At a slight extra cost the following additional equipment can be supplied: An improved taper attachment turret on the carriage, turret on shears, turret tool post, headstocks of the patented geared type for belt and motor drive, triple geared and double back geared headstocks and extra gears and index plates for special fine, coarse and metric threads.

High-Speed Saw with Automatic Stock Feed

A new size of automatic high speed saw known as the Marvel No. 5 has been placed on the market by the Armstrong-Blum Mfg. Company, 339-357 North Francisco avenue, Chicago, Ill. As compared with No. 2 saw, which was illustrated in *The Iron Age* April 15, 1909, this new size is heavier, operates at a higher speed and is provided with an automatic feed for the stock. It marks the development of this type of saw into an up-to-date machine tool



The Marvel No. 5 High-Speed Saw with Automatic Stock Feed Made by the Armstrong-Blum Mfg. Company, Chicago, Ill.

and is especially useful where a number of duplicate pieces have to be cut. For this particular class of work it is claimed that the saw will do the work of approximately ten of ordinary type and at the same time effect considerable savings in the amount of time and labor required while the work is very accurate.

With the automatic stock feed, the bar is fed forward automatically after the piece has been cut and a new cut started without stopping. The bar is clamped in the traveling vise, which travels along a double track of $1\frac{1}{4}$ -in. round

steel shafting at the back of the machine. When the piece has been cut off, the saw frame is raised and the chuck opened. The traveling vise which carries the end of the bar is drawn forward by the automatic stock feed until the end of the bar bears against the gauge, which is mounted on the left vise track. This contact closes the vise and starts the saw frame down and a new cut is taken. This operation is continued until the entire bar is cut, when the machine automatically stops.

The saw frame always moves in a horizontal position and is actuated by a crank lever which imparts a smooth even cutting stroke to the blade and returns it at an accelerated speed. The saw operates on the draw cut principle, cutting as it is drawn forward and being lifted clear of the cut on the return stroke. A friction disk at the top of the screw enables any desired pressure on the saw blade to be secured during the cutting stroke. A right and left hand screw on the connecting rod which can be operated while the saw is running controls the position of the saw frame and enables the entire blade to be used up by shifting the frame. A shifting bolt in the crank also enables the stroke to be varied from 4 to 6½ in., while for varying the depth of the cut two adjustable dogs are provided. These are located in a slot in the saddle at the back of the machine and are readily accessible.

The chuck which grips the stock is of ample proportions, jaws extending out flush with the saw blade. A movement of 8 in. is available for feeding the stock and the chuck will swivel to either side for cutting at an angle. Cooling compound is forced against the blade while cutting in a steady stream by a plunger pump with ball valves and overflow tank. The pump is immersed in the bottom of the large storage tank and together with all connections can be removed in about 5 min. by taking out two cap screws from the outer wall of the tank. The machine has a capacity for cutting stock 6 in. square. In a series of tests recently made a ½-in. bar of round steel was cut in 45 sec., a 2-in. bar in 2 min. 20 sec., a 3-in. bar in 5 min., a 4-in. one in 7 min. 45 sec., a 5-in. bar in 13 min. and a piece of 6-in. round stock in 24 min.

The saw is driven by a belt and operates at a speed of 130 r.p.m. The net weight of the machine is 565 lb. and the crated shipment weight 650 lb., exclusive of the track for the vise.

Jefferson Union Elbows

For use where a union is required near an elbow, the Jefferson Union Company, Lexington, Mass., has recently placed on the market a combination union and elbow. In their construction the features of the maker's straight and swing unions which were illustrated in *The Iron Age* April 28 and September 1, 1910, respectively, are embodied. These fittings are made in all of the standard pipe sizes with 90 and 45 deg. elbows. Their use does away with gaskets and two or three pipe joints and three or four fittings together with a saving in both labor and expense. Both internally and externally threaded elbows can be

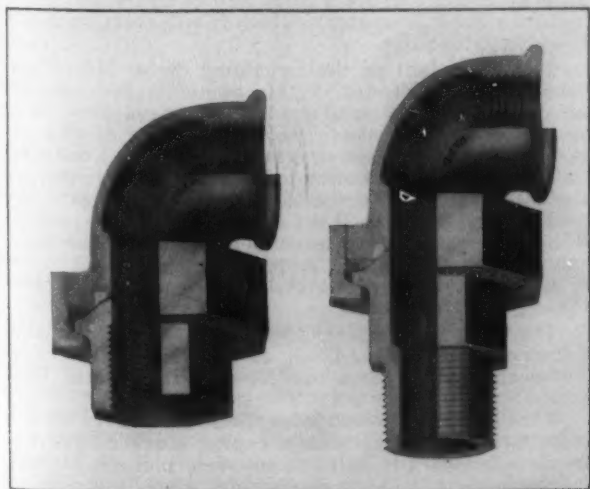


Fig. 1.—The Elbow With Internal Threads. Fig. 2.—The Elbow with External Threads.
Two Types of 90-Deg. Jefferson Union Elbows. Made by the Jefferson Union Company, Lexington, Mass.

supplied, the former being illustrated in Fig. 1 and the latter in Fig. 2.

It is not necessary to have the pipe and the elbow in exact alignment, a feature which is made possible by the construction of the union. This has the standard Jefferson ground spherical brass-to-iron joint, which is not corrodible and makes a tight joint without the use of a gasket. There is also a large amount of play between the nut of the union and the swivel end, which makes the former easy to apply even when the alignment is not exact. The construction of the nut and its adjustment to the swivel and the brass seat ring are two features peculiar to the Jefferson line of unions. Two of the special features of this seat ring are that it is turned from seamless tubing, which renders it free from blow holes and imperfections, and it is also set in a recess away from the runway of the pipe with an iron wall on each side, an arrangement which prevents any possibility of loosening on account of the difference in the expansion and the contraction of the iron and the brass.

Malleable iron is employed for the pipe ends, which are threaded with Briggs standard taper pipe threads. In this way there is no danger of the pipe ends stretching, and the use of a standard taper thread insures a tight joint throughout its entire length. The nut threads are made coarse to permit rapid adjustment and as they are coated with graphite, both for lubrication and as a preventive of corrosion, the union can always be easily disconnected after it has been in use.

More Burt Filters for the Gary Works

The Burt Mfg. Company, Akron, Ohio, claiming to be the largest manufacturer of oil filters in the world, has just received another order from the United States Steel Corporation for two filters of what the company terms its Gary unit type, as this particular type of filter was first installed in the plant of the United States Steel Corporation at Gary, Ind. When these last two filters are in operation, a grand total of 14 will be in use in the plant. They are used in connection with the flush system of lubrication, and each filter in cleaning 2,000 gall. of oil per hour, or 28,000 gall. per hour for the 14, making this oiling system the largest installation in the United States. The outside sheets of the filters are made of No. 10 gauge iron, riveted and caulked, and the inside construction of No. 16 gauge, making them strong and durable. All fittings are extra heavy, and are screwed into heavy brass flanges. The filters are so constructed that any number can be operated as one, and additional filters can be attached without changing any connections. The first order received from these parties called for 5 units, and after six months' trial they duplicated the order. Later on they ordered two more, and with the two just ordered make a grand total of 14.

An Unusual Stock of Swedish Steel

The Swedish Iron & Steel Corporation, 12 Platt street, New York, which has been in business since February of 1908, has gathered together what is thought to be the largest stock and the widest variety of sizes of tool steel ever collected by one selling organization. The company has established warehouses in the Bush Terminal at South Brooklyn and its stock list shows fully 800 sizes of Swedish tool steel aggregating 4000 tons. George P. Toby, president of the company, recently made two trips to Sweden to arrange for extensive shipments and he was assured that the company's stocks are more complete than even those carried by regular manufacturers of Swedish steel. The company makes a specialty of marketing the Sisco Acorn grade, which is especially adaptable for battering or edge work. In addition to carrying a large stock in the Bush Terminal warehouse the company has extensive warehousing facilities in New Orleans, La.

The American office of H. Koppers, located at Joliet, Ill., announces another coke oven contract. This has been closed with the Coal Products Mfg. Company, Chicago, for 35 Koppers improved combination coke and gas ovens. The plant will be erected near Joliet, and the surplus will be sold to the United Gas & Electric Company, Aurora, Ill. The coke will be sold for foundry and furnace consumption as well as for domestic purposes.

The Machinery Markets

A gradual improvement in the demand for machinery is noticeable in most selling centers. The trade generally is interested in the announcement that the Sprague Electric Company, New York, is to be merged with the General Electric Company, Schenectady, N. Y., under the name of the Sprague Electric Works of the General Electric Company. Both inquiries and orders have increased materially in the New York market and the business is widely scattered. New England machinery men are interested in the announcement that the purchasing for the Boston & Albany Railroad will be done from Boston in the future. Heretofore it has been handled by the New York Central Railroad. Railroad business is attracting attention in Chicago where the Illinois Central has made purchases against the list recently sent out, amounting to \$40,000, and the leading harvesting machinery interest is buying extensively. An increased demand for wood-working machinery exists in Cincinnati and inquiries for all kinds of metal-working machinery are coming out in better volume. The local business is light in Cleveland, but there are indications of heavy future buying of machine tools for foreign accounts. The demand on the Pacific Coast is well sustained. Prospects of a good cotton crop have developed an increased call for cotton ginning and compressing machinery in Texas and the general market there has taken on a healthy tone. Reports from Baltimore and Philadelphia are not so encouraging, although a better demand for small tools has developed in the latter market.

New York

NEW YORK, May 31, 1911.

While there is an absence of large lists in the New York market, the volume of inquiries has increased very materially during the last week and business has picked up noticeably. At least two New York machine tool selling houses did a better week's business than in any other week of the previous two months. Most of the trading was in the nature of small orders for groups of five or less tools. Machine sellers in general report conditions more encouraging, and a very excellent demand has developed for contracting equipment. The Board of Water Supply of the city of New York awarded contracts last Friday for the building of two sections of the Catskill deep pressure water tunnel, which will call for the use of large amounts of contracting equipment, air compressors, pump machinery and the like. The first section of the contract, from Yonkers to Burnside avenue, was given to the Mason & Hanger Company for \$3,709,372, and a contract for the fourth section, from Union Square to Fore Green Park, was awarded to the Holbrook, Cabot & Rolling Corporation, whose bid was \$5,272,435. Both companies have established offices at the scene of their contracting operations.

While the Cuban and West Indian sugar mill operators are not buying as much machinery this spring as they usually purchase there are some good inquiries out for equipment for delivery in Cuba. Among the large sugar mill enterprises are those of the Conchita Sugar Mill at Allacranes, Matanzas Province, which will rehabilitate three mills that are now idle and make further extensions, and that of the Santa Teresa Sugar Mill at Sitieito at Santa Clara Province, which will make extensive machinery additions.

The Ellis Motor Car Company is planning for the erection of an automobile garage and repair shop at Central avenue and Second street, Newark, N. J., which will be 68 x 237 ft., two stories. It is estimated that the building and equipment will cost \$50,000.

The Pfaltzgraff Pottery Company, York, Pa., desires a second hand steel tank to hold fuel oil. The company will buy a tank of 20,000 gal. capacity or two tanks of 10,000 gal. each.

A fire, May 25, which destroyed several buildings included the plant of the Theodore Schulz Sash & Door Company, 469 Pacific avenue, Jersey City, N. J. The building and its wood working equipment are believed to be beyond repair.

The Rubber & Celluloid Harness & Trimming Company, 54-56 Ferry street, Newark, N. J., will shortly consider the machinery requirements for a five-story addition to its plant now in course of erection. The addition will be 40 x 70 ft. and of brick and reinforced concrete construction. In addition to installing special machinery the company will purchase power equipment to generate from 225 to 250 hp. An electrical unit will probably be installed.

There are inquiries in this market for power plant equipment to be installed by the Jessup & Moore Paper Company, Wilmington, Del. The company is erecting a large new plant and its inquiries indicate that power equipment to generate about 400 hp. will be installed.

James C. Kuhn, candy manufacturer, 78 Carmine street, New York, has had plans prepared by Hunt & Wiseman, architects, 104 West Forty-second street, for a factory building, 50 x 90 ft., six stories and of mill construction, to be erected at 16 and 18 Clark street.

The plant will be equipped with the most modern appliances, consisting of boilers, elevators, etc. A list of the equipment has not been completed, but will soon be prepared.

The U. S. Expansion Bolt Company has been incorporated with \$10,000 capital stock, to manufacture a patent expansion bolt and a line of general hardware. The company has not yet decided as to whether it will erect a factory or have its product made by contract. Frank L. Clute, 100 Broadway, New York, has the company's affairs in hand.

The Crandall Packing Company, Palmyra, N. Y., whose plant was reported as having been destroyed by fire, states that the damage was not as great as was at first supposed. The company has nearly all of its machinery again in operation and is filling orders with practically no delay.

James Knox Taylor, supervising architect, Treasury Department, Washington, D. C., will open bids June 12 for furnishing and installing electrically-driven pumps in the United States post office and court house, New York City.

The Mahoney Boiler & Radiator Company, Green Island, N. Y., recently incorporated with a capital stock of \$75,000, has purchased a factory at Green Island, which it will enlarge and equip. The machinery equipment of the new company's predecessor at Troy will be removed to the Green Island plant and installed together with considerable new machinery. In addition to the manufacture of boilers and radiators the company will make special heaters of large size for public buildings, and coopers' generators; also coal, gas and oil ranges. The incorporators are: Albert C. Mahoney and George H. Sandholt, Green Island, and George L. Tobin, Coeymans, N. Y.

The B. W. Snow Company has been incorporated at Syracuse, N. Y., with a capital stock of \$25,000, for the manufacture of automobile parts and the operation of a general contract machine shop. The incorporators are: J. E. Snow, W. A. Snow and L. S. Chapman.

The Quale Company, 19 Chapel street, Albany, N. Y., is receiving bids for a brick and concrete mill building, 176 x 200 ft., one-story, which it will erect on North Broadway, that city.

The new plant of the Spaulding Bros. Mfg. Company, North Rochester, N. H., manufacturers of electrical insulating material made from wood fibre, is to be located in Tonawanda, N. Y., on a site of 18 acres at Gibson and Wheeler streets and the New York Central Railroad, with a switch to the Niagara River, where a plant covering 11 acres to cost with equipment, approximately \$500,000, is to be erected. The Niagara Power Company's transmission line borders the property on the southwest. A term contract for the use of large quantities of water has been completed with the city of Tonawanda.

The Pratt & Lambert Company, Buffalo, is building a four-story brick addition to its varnish works at Tonawanda street and the New York Central Railroad.

The Eastern Motor Sales Company has been incorporated at Albany with a capital stock of \$300,000, to manufacture and sell automobiles, motors, engines, machinery, etc. The incorporators are: E. P. Boland and C. V. Collins, of Troy, and H. M. Caswell, of Malden-on-Hudson.

The shops of the Erie Railroad, at Hornell, N. Y., are to be enlarged at a cost of about \$60,000. F. A.

THE MACHINERY MARKETS

Howard, assistant manager of bridge and buildings, New York City, is in charge of the work.

The Dunn Ink Works, Buffalo, has acquired the two-story factory property, 50 x 140 ft., at 1543-1551 Niagara street, that city, and will refit and equip it for its growing business. Considerable new machinery will be installed.

New England

BOSTON, MASS., May 29, 1911.

The Boston machine tool and supply dealers appear to be having a varying experience. To quote one man prominent in the trade: "We can see a decided change in business since the decision of the Supreme Court in the Standard Oil case, but our business has been gradually improving since the first of the year, although some sections are still very dull. The business for this month represented by actual shipments and charges will be up to and perhaps more than the average of last year. The first four months of this year show 80 per cent. of the average of last year. We have been having a good average business right along in New England. Nearly all of it has come to us in small orders, mostly single machines. We are really surprised at the amount of business that is going into our books every week, as general business seems to be extremely quiet. Nearly all of our customers who are depending upon railroad business are extremely dull. I would not be surprised if general business revives all over the country in spite of the fact that the railroads are holding up a lot of business and only ordering from hand to mouth. It would be quite interesting to see the country go through an era of prosperity without any help from the railroads."

Another large house gives this view of the situation: "Regarding the trade in general our business has been about the average, though I am inclined to believe that there is a slight falling off if anything. Orders have not increased any in size, either in the machinery or supply line, most all of the goods going out being in small quantities, and in the machinery line in the smaller sized machines. We have felt that the Supreme Court decisions would clear the atmosphere somewhat and cause a slight stimulation in trade, and are still inclined to believe that the month of June will show up pretty fairly well, though there seems to be a good deal of pessimistic talk just at the present moment. The machinery trade in general seems to be rather quiet and we know of no large lots which are wanted in the immediate future, although a few fair-sized memorandums covering future wants have shown up in the market."

The Underwood Typewriter Company, Hartford, Conn., states that the proposed new building, mentioned last week, will be used for general manufacturing. As the structure will be a large one, 50 x 200 ft. six stories, the requirements for equipment should be large.

An official statement of the United Shoe Machinery Company, Beverly, Mass., includes the announcement that this season's shop expansion will approximate four acres of floor space.

Projected additions to general manufacturing works include the following: Samuel Hathaway, New Bedford, Mass., paint factory, 100 x 200 ft., two stories; Hamilton Mfg. Company, Lowell, Mass., cotton goods mill building, 150 x 300 ft., four stories; Plainfield Mills Corporation, Plainfield, Conn., mill, 950 ft. long, of which 490 ft. is to be three stories, the remainder one story, to cost \$600,000; Boston Duck Company, Bonds-ville, Mass., addition 40 x 100 ft.; Aldrich Bros., Moos-up, Conn., weave shed, 150 x 192 ft.

The Crescent Mfg. Company has been organized at Bristol, Conn., to manufacture light hardware. C. G. Garrigus, president and treasurer of the C. G. Garrigus Machine Company, is president of the new corporation; G. O. Hodge, vice-president; F. R. Graves, secretary; W. L. Barrett, treasurer; T. H. Hewitt, Waterbury, Conn., and W. L. Barrett, Bristol, are the other directors. The details of the product are not yet available, but it will be manufactured by machinery built by the C. G. Garrigus Machine Company. The business will be started on a small and conservative scale.

The official announcement is made that the Boston office will do all the purchasing for the Boston & Albany Railroad, following the plan of management adopted in connection with the joint operation of the line by the New York Central and the New York, New Haven & Hartford.

Philadelphia

PHILADELPHIA, PA., May 27, 1911.

While there have been no important changes in general conditions in the local machinery market, merchants in a few instances report a trifle better volume of business closed in small tool propositions. The major portion of the orders have been for single tools and represent business which has been under negotiation for some little time. New inquiries of any consequence are still reported as being rather light. A more hopeful feeling is expressed, however, by some of the manufacturers, particularly those making special tools and equipment, a few of whom have had a somewhat better run of orders. Not many, however, are operating plants at full capacity and it will take a considerable volume of new business to bring them up to normal. There is still an absence of any railroad buying in this territory, although the trade sees encouragement in the better prospects from buyers of that class, from reports coming from the West. Makers of the usual standard lines of machine tools still report business as dragging. In the second-hand machinery market a trifle better business has been reported, owing largely to the fact that some tools of modern design have been offered. In the boiler and engine trade a fair demand for power equipment of moderate horsepower is noted, but business closes slowly and few plants in this district are very busy.

The foundry trade shows no improvement, the demand for machinery castings, both in iron and steel, being light and the general demand irregular. Makers of crucible steel castings for automobile work are, however, pretty fully engaged.

Local builders are figuring on a three-story steel and concrete power house, 115 ft. square, to be built in Charleston, S. C., for the Charleston Consolidated Gas Company, one of the subsidiaries of the United Gas Improvement Company.

Purchases of additional property at Richmond and Cumberland streets, by the William Cramp & Sons Ship & Engine Building Company, adjoining its present plant, are understood to be for the purpose of making an addition to its machine shop. Particulars are not available.

Plans are being prepared by the William Steele & Sons Company for a five-story restaurant and office building to be erected at the southeast corner of Eleventh and Ludlow streets. The building is to be of reinforced concrete and modernly equipped.

The Hilles & Jones Company, Wilmington, Del., notes an improvement in the demand for punches, shears, bending rolls, roller levelers and plate-straightening machines. Recent orders have been largely for single tools, although one recently received included seven shears for one of the constituent companies of the United States Steel Corporation.

The Elwood Ivins Tube Works, Oak Lane, this city, is operating its plant with full force and on full time, with order books in comparatively good shape. This company is increasing its facilities in the way of machinery and has built an additional annealing furnace, increasing thereby its productive capacity. It has also recently succeeded in making seamless tool steel tubing, high in carbon, the use of which overcomes the necessity of boring out solid steel rods for various purposes, as heretofore done.

The Royersford Foundry & Machine Company, Royersford, Pa., reports a very fair demand for its Sells roller-bearing shaft hanger. In its other power transmission lines business has recently picked up a little, but in heavy punch and shear machines the demand is light. Business in general has been below normal, but improving conditions are now expected.

The Frick Company, Waynesboro, Pa., has recently added to its line of ice and refrigerating machinery a new horizontal double-acting ammonia compressor, which it is now prepared to supply in sizes ranging down from 65 tons capacity. Its general sales are about 5 per cent. ahead of the same period last year, or about an average business as based on that for the past five or six years.

The Manheim Belting & Mfg. Company, Manheim, Pa., has been incorporated with a capital stock of \$150,000, and will engage in the manufacture of belting at that location. A factory building, 136 x 176 ft., will be erected. Charles Bond, Philadelphia, is president; G. S. Dana, vice-president; M. M. Pfautz, secretary, and M. G. Hess, treasurer of the new company. The special machinery for the manufacture of the belting has been provided for, but the company will be in the

THE MACHINERY MARKETS

market for about 200-hp. boiler capacity and an engine of 100 to 150 hp.

The Ferracute Machine Co., Bridgeton, N. J., advises that there has been a gratifying increase in its aggregate business each month in the past year. Its plant is being again operated at full capacity. The foreign demand has continued good and is now showing an increase, particularly in the line of high-speed armature disk notchers, a number of which have been shipped to European manufacturers of electrical goods. The use of sheet-steel stampings in automobile work has resulted in increased orders from automobile makers for presses for that class of work, one lot of 13 being furnished a prominent maker in Detroit, for pressures ranging from 8 to 1000 tons.

The R. S. Newbold & Son Company, Norristown, Pa., finds business somewhat better than it was several months ago. Recent shipments include a heavy bar shear, of about 80 tons; a 28-in. plate mill for the Allegheny Steel Company, and several stacks, 6 to 8 ft. in diameter, and from 100 to 175 ft. long, together with a considerable quantity of gas and air piping for various plants in the Schuylkill Valley district. Among orders recently taken may be mentioned a 42-in. plate shear and a rotary shear, to cut 1-in. plates, for the Logan Iron & Steel Company; four straightening machines for the Indiana Steel Company, and complete furnace tops for the West End Furnace Company, Roanoke, Va.; the Colonial Iron Company and the Warwick Iron & Steel Company. Six washer-punching machines of the Mason type are also being built for various concerns.

The Ebensburg Coal Company, Colver, Pa., will, in connection with the development of its coal properties, build an electric power plant for the purpose of supplying power to its mines and light to the town of Colver. The plant will ultimately have a capacity of 3600 hp. B. Dawson Coleman, Lebanon, Pa., is the president of the company, and Frank C. Roberts & Co., Philadelphia, are the engineers for the power plant.

Baltimore

BALTIMORE, Md., May 29, 1911.

General market conditions in the iron, steel, machinery and allied industrial trades have shown a further slowing down in the past month. While here and there slight betterments may be noted, activity at the majority of industrial plants is less pronounced than during April. In the metal-working machinery lines, particularly as far as new tools are concerned, the demand has been light. This, in a considerable degree, has been due to offerings of second-hand equipment, particularly the extensive line of modern tools offered by Freidenwald Brothers, which concern has recently retired from active business. In wood-working tools buying has been somewhat more active. In the heating and ventilating lines some fair business has been placed, a good volume of new work is being figured on and plans are on engineers' boards for considerable further work. Practically all contractors in this class of work are well engaged. The demand for engines and boilers keeps up quite actively, but requirements run to the small capacities and do not close up very satisfactorily. Machinery and machine shop supplies are not very active, purchases in the majority of instances being small. Contractors' equipment has been a trifle more active, owing to the increased amount of work which has been done in the way of road building in this vicinity.

Special machine tool and machinery builders report a fairly good volume of business, but the few builders of tools of the more standard type still find the demand very irregular. Several very fair propositions in building construction work have developed. Recent contracts of this character have been principally for reinforced concrete and slow-burning mill construction. With few exceptions, fabricators of structural material are not very actively engaged and new work appears to be developing more slowly. Prices of fabricated work continue low. The new tower-building contract for the Maryland Casualty Company, requiring some 1100 tons of structural material, has been awarded to Dietrich Brothers, who also have the contract for the structural work for the Baltimore Bargain House. Municipal contracts during the month have been unimportant, as far as the general iron, steel or machinery trade is concerned. Local foundries report business as being of an unsatisfactory nature.

Cumberland, Md., at a municipal election on May 16,

decided favorably on the issuance of bonds to the amount of \$500,000, for the purpose of providing for a new water works. James H. Fuertes, New York, will, it is understood, be engineer in charge of constructing the new water plant.

The Frederick Railway Company has made application to the Public Service Commission to extend its tracks in Frederick City, Md., and to issue bonds amounting to \$150,000, to cover this and other proposed improvements.

Engineers are figuring on furnishing and installing the heating, power and ventilating plant for the Woodward Building, Washington, D. C.

Bids for the construction of the Norfolk Terminal Station, Norfolk, Va., received several weeks ago, have not yet been opened, while the opening of those for the construction of the Riggs Hotel and Theatre, Washington D. C., have been held up temporarily.

The Ellicott Machine Company has booked several fair orders for its line of dredging equipment in the past few weeks and is more fully engaged. Inquiries for some more extensive dredging outfits are being figured on.

The sale of the old ice manufacturing plant of the Atlantic Ice Company, 7, 9, 11, 13 South Frederick street, to the Independent Ice Company is reported. It is stated that the plant will be overhauled, re-equipped and operations started at an early date.

The general contract for the erection of the new Scottish Rite Temple, Washington, D. C., has been awarded to Norcross Brothers, Worcester, Mass. Sub-bids, it is understood, have not yet been let.

John B. Adt has taken a number of orders for special machinery for tobacco working, both from foreign and domestic customers. Several large elevator installations, as well as further special machinery, are being estimated on. This plant is operating at full capacity and has sufficient work on hand to keep it so engaged for some time ahead.

Work is about to be started on the new building for the Coca Cola Company at Pratt and Concord streets. Plans call for an eight-story brick and stone structure, to cost complete several hundred thousand dollars. Arthur Tuft is the architect and builder. Contracting engineers are now figuring on the power and heating plant.

The Crook-Kries Company has completed its contract for the heating and ventilating work on the United States Fidelity Building, and practically completed that for the Fidelity & Deposit Company Building. Recent orders for heating and ventilating work have been of moderate size, sufficient, however, to keep all departments fully engaged. Considerable new work is in sight and the estimating department is operating at top capacity. Fair orders for engine and boiler installations of moderate horsepower have recently been taken by this company.

The Maryland Steel Company is reported to have received a contract for a large seagoing steel tugboat, for the Spanish-American Iron Company, for use in Cuban waters. This company has just laid the keels for two self-propelling oil barges, to be built for the government. These vessels will be 165 ft. long and 25 ft. beam, and have a cargo capacity of 153,400 gal. of oil.

The Baltimore Retort & Fire Brick Company, which has not been very actively engaged recently, is now busy on work for delivery during next month. This company has taken orders for considerable work in connection with gas plant installations. A contract for a new Dutch oven, to be installed at the plant of the Baltimore County Water & Electric Company, has also been recently booked. The general demand for fire clay products, however, is not particularly active.

Wallace Stebbins & Sons have been awarded the contract for the steam-heating work, including piping and radiation, for the Maryland Tuberculosis Sanitarium, at Sabillasville, Md. This firm reports a good demand for power plants of small and moderate size, although trade in general supplies and fittings continues rather irregular. General business in May was about up to the average.

The Chesapeake Iron Works has been fairly busy. Among recent contracts taken were those for the Woodward Apartment, Washington, D. C.; the Murchison Warehouse, Wilmington, N. C., requiring 100 tons of structural and ornamental iron work, and the Casey Building in this city. This company's plant continues fairly busy on work in hand, and its estimating department is figuring on a fair amount of small and moderate-sized specifications.

THE MACHINERY MARKETS

The New York Central Iron Company, now located at Geneva, N. Y., will erect a new plant at Hagerstown, Md., where it has acquired some 15 acres of land. Plans and specifications are now being prepared for the buildings to be erected, which will be one-story high and aggregate somewhere in the neighborhood of 30,000 sq. ft. of floor space. The buildings are to be of structural steel, with side walls largely of glass. The equipment for the new plant has not yet been determined upon. C. E. Williams is secretary of the company.

The Baltimore Bridge Company has received the contract to furnish the structural steel work for the Army and Navy Club; Washington, D. C., and has also received further orders from the Republic Finance Company for its Portland cement plant, at Union Bridge, Md., the latter order including a bridge extending from the crusher mill to the stock house, and floor and track work in the crusher building. This concern is busy on orders in hand. Work for export and moderate inquiries for domestic work are being figured on.

The T. C. Bashor Company, while finding new business somewhat lighter in May, has been quite busy in all departments and has considerable new work in sight. The past month has been one of heavy deliveries, both in boilers, tanks and general equipment. A moderate amount of engineering work has been taken, including some large piping work for the new Highlandtown plant of the Crown Cork & Seal Company. A number of power installations are being estimated upon, both for heating and general power stations.

Dietrich Brothers have been awarded the contract for the erection of the structural work, about 1100 tons, for the new tower building to be erected for the Maryland Casualty Company, at Baltimore and North streets. Considerable ornamental iron work is also to be furnished. The tower of the building will be the highest in the city. A number of smaller orders have been taken, including the Maryland School for the Blind, in Baltimore County, and for a court house at Chowan, N. C. All departments of this company's plant are actively engaged, although work has not been as plentiful in ornamental work as it was some months ago.

While considerable municipal business is offered for estimate, little work of particular interest to the trade has come out. On May 18 the Highway Commission received bids for furnishing and erecting a Strauss trunion bascule bridge on Eastern avenue over Back River, but awards have not been announced. On May 31 bids will be opened by the Board of Awards for constructing the Junction sewer, at the sewage pumping station, which includes the furnishing of 40,000 lb. of concrete-reinforcing steel. On May 24 the same commission received bids for the construction of an office and laboratory building at the Back River sewage disposal works, but awards have not yet been announced.

Plans are progressing favorably for the erection of the new manufacturing building to be known as the Beehive. With subscriptions complete, the option on the site at Preston and Clifton streets has been taken up and plans for the transfer of the property are being made. P. O. Keilholtz, engineer, is now engaged on final plans and specifications, and bids will be asked at an early date. The building is to be the most modern of the so-called beehive type of manufacturing buildings.

Cleveland

CLEVELAND, OHIO, May 29, 1911.

The demand for steam engines and boilers in this territory is quite active. Sales agents are getting a good volume of orders and considerable business is in prospect. Builders of planers and boring machines report an improvement in inquiries, which are fairly plentiful, but orders are very slow in coming out. Encouraging reports are made regarding the condition of the foreign trade in machine tools, which has improved considerably.

Business with the local machinery houses continues rather light with little indication of much improvement in the near future. Their May volume of orders will aggregate about the same as during April. Sales are confined mostly to small tools for repair shops. There is some demand from steel plants and tire-making plants, and an occasional order from an automobile manufacturer. Few tools, however, are being bought by large manufacturing plants. Railroads continue to hold off so that there is very little business from that source in this territory. Some tool builders that have

kept their plants running at about full capacity making machines for stock have now accumulated good-sized stocks.

There is more second-hand machinery on the market than for some time. The demand for second-hand tools is not active.

The K. W. Ignition Company, Cleveland, has let a contract for the erection of a new plant to the Hunkin-Conkey Construction Company, Cleveland. The plant will be located at East Thirtieth street and Chester avenue. It will be 75 x 165 ft., four stories of steel and reinforced concrete. The company expects to be in its new quarters in five months. Considerable machinery will be needed to equip the plant, including drilling machines, screw machines and lathes. Elevators will also be required. The company has already placed orders for its power equipment.

Plans for the new plant to be erected by the Taylor & Boggis Foundry Company, Cleveland, have been completed by the Cleveland Engineering Company. The plant will include a foundry, 112 x 420 ft., a builders' hardware manufacturing department, 111 x 270 ft., a pattern storage building, 50 x 200 ft., and an office building, 51 x 135 ft. The office building will be two stories, the other buildings one story. They will be of steel and mill construction.

The Cleveland office of the Erie City Iron Works, Erie, Pa., reports the receipt recently of the following orders: Two 20 x 27-in., direct-connected, four-valve, simple engines for Corrigan, McKinney & Company, at Scottsdale, Pa.; three 150-hp. Scotch marine engines for W. S. Weiant & Sons, Newark, Ohio; one 200-hp. boiler for the Barnesville Gas & Electric Company, Barnesville, Ohio; one 14 x 14-in. high-speed engine for the W. S. George Pottery Company, East Palestine, Ohio; one 300-hp. water-tube boilers for the George H. Gynn Brick Company, Cleveland, Ohio; two 250-hp. water-tube boilers for the St. Louis plant of the National Electric Lamp Company; two 72-in. x 18-ft. tubular boilers for the Saxton China Company, Sebring, Ohio; two 250-hp. horizontal water-tube boilers for the Cleveland plant of the Standard Oil Company; two 258-hp. vertical water-tube boilers for the Tuscarawas County Electric Light & Power Company, New Philadelphia, Ohio, and one 150-hp. tubular boiler for the Walsh Paper Company, Cuyahoga Falls, Ohio.

M. T. Silver & Co. and the Sunshine Cloak & Suit Company, Cleveland, will erect a new garment factory on Superior avenue near Twenty-fourth street. It will be 175 x 290 ft. and three stories. Each company will occupy one-half of the building but there will be a joint power plant. J. Milton Dyer is the architect.

The Willys-Overland Automobile Company, Toledo, Ohio, has let a contract to W. E. Wood, Detroit, Mich., for a large addition to its plant, work on which will be started at once. The new building will be of reinforced concrete, 300 x 400 ft. and five stories.

The Binns-Down Mfg. Company, Canton, Ohio, has been incorporated with a capital stock of \$100,000 to manufacture metal and wooden novelties. James R. Binns, Elmer E. Downs and others are the incorporators.

The Baker Motor Vehicle Company, Cleveland, will enlarge its plant by the erection of an addition, 40 x 100 ft.

The Urschell Mfg. Company, Toledo, Ohio, is planning to enlarge its capacity and has made a proposition to move to Bowling Green, Ohio, and take over the plant of the Standard Machinery Company in that city and erect new buildings. The Urschell company makes among other products marine engines and nut and bolt machinery.

The Ashland Steel Range & Mfg. Company, Ashland, Ohio, shipped a carload of concrete mixers to Sidney, Australia, recently, and has just received a duplicate order for a carload of ten machines.

The Galion Iron Works Company, Galion, Ohio, has increased its capital stock from \$100,000 to \$150,000.

The foundry of the Ashland Foundry & Machine Company, Ashland, Ohio, was destroyed by fire May 22 causing a loss of about \$8,000. The company will probably rebuild its plant.

The Lundgren Aeroplane Company, Youngstown, Ohio, has elected C. H. Dunn president and L. B. Burger secretary and treasurer. The company is now considering a site for a plant.

The Otis Lithograph Company, Cleveland, will erect a new plant. It will be 125 x 300 ft., one story and of reinforced concrete construction.

The Kelley Boiler Company, Wellsville, Ohio, has

THE MACHINERY MARKETS

been incorporated with a capital stock of \$20,000 by W. H. Kelley, S. G. Davis, A. A. Weigel, E. S. Noble and M. T. Abbott.

With a capital stock of \$25,000 the Cleveland Auto Starter Company, Cleveland, Ohio, has been incorporated by E. A. Curtis, R. R. Crezin, M. R. Moffatt and V. M. Loika.

Cincinnati

CINCINNATI, OHIO, May 29, 1911.

Local manufacturers of engineering supplies, as well as those turning out plumbing goods are very busy. There is a decided improvement in the demand for woodworking machinery, and recently the railroads have bought considerable equipment of this kind.

Machine tool builders make somewhat conflicting reports, but they all state the outlook is some brighter, and few are receiving enough orders from the general trade to keep them running on full time without adding largely to their stocks. Inquiries and orders received are fairly evenly distributed between the different kinds of machine tools, with the exception of the larger sized planers, which is probably due to the absence of railroad buying, although an improvement in the demand from this source for other kinds of machinery, would indicate that the railroads may come into the market as large purchasers of machine tools before the year is completed.

The Ohio Metals Treatment Company is a new Cincinnati incorporation, with \$200,000 capital stock. The incorporators are W. T. Judkins, D. Lamon, Thomas S. Baen, Robert M. Fishback and E. J. Babbitt. The company owns a patented process for hardening and toughening metals, and has leased part of the old Victor Safe Company's plant at Ninth street and Broadway, that will be used for demonstrating purposes.

The American Tool Works Company, Cincinnati, has found it necessary to extend its facilities by converting part of a nearby building, formerly used for warehouse purposes, into a manufacturing branch.

The M. Werk Company, Cincinnati, soap manufacturer, has acquired a building site near Ivorydale, Cincinnati suburb, on which will be erected several concrete buildings. In addition to the large amount of special machinery that will be required, there will be a power plant, including electric lighting equipment. The name of the architect will be announced within the next few days.

The General Foundry Company, Warren, Ohio, has increased its capital stock from \$58,000 to \$125,000.

The new power plant, and other new buildings being constructed at the University of Cincinnati, are now under cover, and the machinery is being installed. The power plant will be in operation before July 1.

Among nearby contracts recently let, that will require a large quantity of structural steel material, is one for a nine-story office building to be erected at Portsmouth, Ohio, for the First National Bank at that place. The Roche-Bruner Building Company, Johnston Building, Cincinnati, has this contract in charge.

The Tampa Iron & Foundry Company, Tampa, Fla., recently organized, has placed orders for a large quantity of its equipment with Cincinnati firms. The John Steptoe Shaper Company is shipping the new company several of its shapers and the Rahn-Lamon Company a number of gap lathes.

The Waterproof Paper & Board Company, Cincinnati, has decided to erect a paper mill at some point near Cincinnati, probably at Hamilton. Only preliminary building plans have been made up. In addition to paper mill machinery, a large power plant will be required.

The Ohio Electric Car Company, Toledo, Ohio, has increased its capital stock from \$150,000 to \$250,000. It has not yet been announced as to whether this change means any increase in present facilities.

The city of Cincinnati will soon require several large steel tanks to contain a total of 2,500,000 gal. of water, to be erected at the Mt. Auburn station.

Contract for the new general hospital in Cincinnati, recently mentioned, has been awarded to the Westlake Construction Company, St. Louis. There will be 16 large buildings, and preliminary work will commence within the next 30 days.

Bids for a lock and dam to be constructed on the Kentucky River, near Heidelberg, Ky., were opened in Cincinnati May 25 by Major John C. Oakes, engineer in charge. The lowest bid was over \$350,000, but the contract has not yet been formally awarded. A large

quantity of cement and reinforcing bars will be required by the contractor.

The Tiffin Wrench Company is a new incorporation at Tiffin, Ohio, with \$5,000 capital stock. The incorporators are: C. F. Nighswander, George W. Nichter, H. W. Yeager, J. J. Flick, W. H. Kildore and John C. Loomis.

The Union Gas & Electric Company, Cincinnati, has decided to erect a large substation in the business district. The estimated cost of the station, with its equipment, is placed at \$200,000.

The J. W. Curry Company, Cincinnati, manufacturer of waterproof driving belting, will erect a two-story addition to its plant on Cummings street. All equipment has been purchased.

Contract for the erection of the Franklin Paper Company's plant at Franklin, Ohio, has been awarded to the United States Roof Company, Middletown, Ohio. Work on the foundations will be commenced within a few days.

Detroit

DETROIT, MICH., May 29, 1911.

There appears to be little or no change in market conditions, manufacturers being well pleased with trade. The automobile demand continues excellent, which in turn brings about prosperous conditions with the auto accessories men. Railroad equipment concerns are very quiet, one large company having made a reduction in its working force of 75 per cent. and another having turned the bulk of its foundry work over to the manufacture of structural iron. However, the late bond issues by several railroads of this and neighboring states for improvements are expected to inject some life in this branch.

Architects are taking figures on an addition to the plant of the Timken-Detroit Axle Company of this city. The building is to be fitted with trackage and will be used to store steel.

The Grabowsky Power Wagon Company of this city has increased its capital stock from \$50,000 to \$1,000,000. The funds will be used in increasing the capacity of the plant, it being the plan to double its output. Max Grabowsky is president of the company.

A new company was incorporated this week under the name of the C. K. Davis Mfg. Company. The company has a capital stock of \$25,000 and will locate in this city. C. K. Davis is behind the enterprise.

An important financial combination was effected this week when the five Hupp corporations of this city were consolidated with a capital stock of \$700,000, of which \$400,000 is paid in. The companies entering this merger are the Hupp-Yeats Electric Car Company, Hupp-Turner Machine Company, Hupp-James-Geyman Foundry Company, Hupp-Johnson Foundry Company and Robert C. Hupp Sales Company. The plants of the company occupy about 60 acres.

The Michigan Vacuum Cleaner Company has filed articles of incorporation with a capital stock of \$8,000. The company will make a low priced machine of powerful suction. Among the stockholders are L. C. Wilson and John Fry, both of this city.

The Tilden Saw Company has made an important increase in its capital stock, raising the amount from \$60,000 to \$100,000. The increase will allow enlargements and will increase the plant capacity. The principal stockholders are C. H. Tilden and George M. Tilden.

The officers of the Detroit Shock Absorbing Company are preparing to increase the company's capital stock from \$50,000 to \$150,000. They plan to secure a factory or build a plant for the manufacture of the auto accessory it controls.

The Detroit Wire Bound Box Company has reduced its capital stock from \$75,000 to \$50,000.

The shingle mill at New Dalton, Mich., belonging to E. S. Harris was burned this week. The plant was carrying only \$8,000 insurance at the time. The mill will be rebuilt.

Elaborate additions to the plant of the Kalamazoo Bread Company are being planned. Two new additions will be erected and the most modern bread making machinery will be added to the equipment. A \$10,000 bond issue will care for the improvement. Alderman Chidister is the owner of the plant.

The Flanders Mfg. Company, Pontiac, Mich., is making plans for a record output in motorcycles. A new plant will be erected in the course of a few weeks for

THE MACHINERY MARKETS

the manufacture of electric cars. The company intends with the new addition to make 3000 electrics as an annual output.

The City Council of Lansing, Mich., has voted to appropriate sufficient funds for the purchase of a plant for the making of pavement. The purchase of the plant is left with the committee on streets.

The Burrough & Blood Company, Marshall, Mich., maker of vehicles, as the result of a cash inducement to remain in the city, will build a new plant to care for their increasing business. Charlotte, Mich., made a strong bid for the plant.

The Holland Furnace Company, Holland, Mich., will add a new department to its plant which will double its capacity. The new department will be in a tin shop and metal works for the making of dustless ash cans and garbage pails.

The Alert Pipe & Supply Company, Bay City, Mich., has taken out a building permit for the construction of a steel covered building 25 x 65 ft.

The Hardware Supply Company, Grand Rapids, Mich., has filed a trust mortgage securing a loan for \$10,000, which the company desires for the purchase of machinery.

Toledo capitalists are planning the location of a canning factory at Eaton Rapids, Mich., making use of about 2000 acres of bog land, which will be used for truck gardening. Particulars can be had from the Business Men's Association.

The east mill of the Bogardus Lumber Company at Peelston, Mich., was destroyed by fire recently. The loss to the machinery and plant will reach \$10,000, fully covered by insurance.

Burrows & Wells, architects of this city, are preparing plans for the erection of a large factory building at Tecumseh. The plant is being built for P. W. A. Fitzsimmons, who can furnish particulars.

The Union City Roller Mills has passed into the hands of the Randall Bros., who will remodel it into an up-to-date flour manufacturing plant, erecting an elevator of 20,000-bushel capacity and installing new machinery and equipment. Earl W. Randall, Tekonsha, Mich., and Ray E. Randall, Plymouth, Ind., constitute the new firm.

The Barnes-Baker Mfg. Company, St. Joseph, Mich., will move to Holland, Mich., where it is planned to erect a suitable plant. The company was only recently incorporated. The company has a capital stock of \$40,000, of which \$10,000 is to be subscribed by citizens of Holland.

The city of Muskegon is planning to spend \$360,000 for water works improvements, including a new plant. The proposition is yet to be voted upon.

Secretary Halsey of the Pontiac Commercial Association writes that the city is almost certain to land a big auto accessory company of Blissfield, Mass. The concern has a capital stock of \$50,000 and is desirous of locating nearer the motor car manufacturing center.

The Wilson Packing Company, Jackson, Mich., will build a large addition to its plant this summer, to care for its increasing business. It will also build a salting plant at Grass Lake.

Formal notice has been given that the Escanaba Mfg. Company, Escanaba, Mich., is to greatly enlarge its present plant. T. M. Judson, superintendent of the company, states that ground has been secured for the erection of a new building.

Chicago

CHICAGO, ILL., May 29, 1911.

A fair amount of railroad business has been placed during the past week. Western roads are undoubtedly aware of the condition existing in many of their antiquated shops and it is hoped this slight tendency to improve conditions will be contagious. The Illinois Central Railroad has purchased between \$12,000 and \$15,000 worth of machine tools in this market. The three lists of the Northwestern which have been pending for some weeks have also been closed, the transaction amounting to about \$40,000. The Illinois Central is out with a preliminary list approximating about \$25,000 and an appropriation to cover these needs will probably follow as soon as approximates of the amount of purchase can be obtained. The big deal of the American Steel & Wire Company is still pending. The leading harvester interest is in the market for between \$10,000 and \$12,000 worth of machine tools for its Milwaukee works and for about \$3,000 for the Deering plant in Chicago. Buying tendency seems to have

changed from cheap and second-hand tools to the very best money can purchase. Many prospective buyers are even showing a perfect willingness to await delayed deliveries in order to secure top-notch material. This indicates just a moderate volume of business, as it has been the history of the machine tool trade that when business was rushing, cheap or second-hand tools were in demand because quick deliveries of goods of this nature were almost certain. On the other hand, when business was extremely quiet this class of machine tools were in demand because of forced temporary economy. The present condition of trade may be taken as an indication of an approach to normal business conditions.

The National Stamping & Electric Works has removed its business from 216-220 South Jefferson street to 410-426 Clinton street, Chicago. The company has installed considerable new equipment and will continue to manufacture specialties as in the past.

Webster City, Iowa, will lay about two miles of water mains during the present summer.

The Park Dam Company, Eldora, Iowa, which owns two sites on the Iowa River, one at Eldora and the other at Steamboat Rock, is at present engaged in the construction of a power plant at the former location, having completed a concrete dam at that point last fall. A plant will be installed at Steamboat Rock as soon as the one now under construction is completed. Equipment for the plant at Eldora has been purchased, but the necessary equipment for the second plant will not be purchased until a later date.

The question of installing an electric light plant at Kimball, Neb., is under consideration. Of the \$280,000 worth of Kimball irrigation bonds recently issued \$240,000 have been sold and construction work will be commenced as soon as the remaining \$40,000 have been disposed of.

The South

LOUISVILLE, Ky., May 29, 1911.

The demand for machinery continues quiet, conditions being little changed as compared with the weeks preceding. Not as much business appears to be in the market. Power equipment is rather dull, while machine tools and other general lines are also quiet. Pumps are more active. Quarry equipment remains in only fair demand.

Henry H. Martin, who resigned as vice-president and general manager of Grainger & Co., structural iron manufacturers, several months ago, has announced that he will go into the foundry business. A contract will be let at once for the erection of a building, 36 x 100 ft., at Cabel and Franklin streets, Louisville; the plant will begin operations in July, it is hoped. It will have an initial capacity of about five tons a day. Gray iron castings will be made, and furnace castings will be featured.

B. F. Avery & Sons, plow manufacturers, are planning to increase the capacity and rearrange their foundry and forging departments. Members of the company state, however, that no new equipment will be required.

The Henry Vogt Machine Company, Louisville, is in the market for a 21 x 12-in. vertical milling machine. This is in addition to an 800-lb. steam hammer, on which it asked prices several weeks ago.

The Lenham Hardwood Flooring Company, Louisville, which recently increased its capital stock from \$30,000 to \$50,000, has announced that it will erect a power plant. Its equipment is operated by electric drive, the power heretofore having been secured from a local central station. It will hereafter manufacture its own current, and will install a 150-hp. boiler and engine.

The Kentucky Traction & Terminal Company, which was organized at Lexington with \$2,500,000 capital stock for the purpose of taking over a number of Bluegrass traction properties, has purchased two acres of land on Limestone street, Lexington, which will be used as the site of its new \$500,000 power house. Plans are practically completed for the new power house, and contracts for the equipment will be let within the next six weeks. Address the general manager, I. L. Oppenheimer.

The Louisville & Nashville Railroad, with general offices in Louisville, will locate the division shops for the new Lexington & Eastern extension, which it is building at Jackson, Ky. The shops will be among the largest in the State.

The Jeffrey Mfg. Company, Columbus, Ohio, has

THE MACHINERY MARKETS

secured the contract for the installation of a coal tipple for the Asher Coal Company, at Wasioto, Ky.

The Allburn Coal & Coke Company, Allburn, Ky., which was recently incorporated with \$25,000 capital stock, has taken over part of the holdings of the Pike Collieries Company, and will develop it. Some equipment will be required a little later.

Proposals will be received by the Kentucky Board of Control of Charitable Institutions, Albert Scott, president, until June 6, for the equipment of three water-tube boilers with stokers of the underfeed plunger type. Address proposals to Central Kentucky Asylum for the Insane, Lakeland, Ky.

Isadore Katzenberger, New York, has announced that an office building of 25 stories will be erected at Madison and Main streets, in Memphis, Tenn.

The Dixie Clay Products Company has been organized at Chattanooga, Tenn., with \$100,000 capital stock, for the establishment of a clay-working plant. John S. Spence is president, Alvin L. Spears, vice-president, and J. W. Abel, treasurer. The plant is to be located at Graysville, Tenn., and roofing tile, faced brick, etc., will be manufactured. Clay-working machinery will be installed at once.

The plans for an electric-light plant at Pulaski, Tenn., have about been matured. H. M. Grigsby is in charge of the project.

A laundry is to be established at Franklin, Tenn., by the Harpeth Electric Light & Power Company.

Mills & Lupton, dealers in machinery and mill supplies, Chattanooga, Tenn., who are now located at 320 Carter street, will soon occupy a new building, which is being erected for them by the Stone Fort Land Company. Electric elevators are to be installed in the structure, which will have 35,000 sq. ft. of floor space.

J. S. Rawlings, Carrollton, Ky., is planning the establishment of a refrigerating plant at Tullahoma, Tenn.

C. I. Tune has had plans drawn for a garage and automobile repair plant to be erected at Chattanooga, Tenn.

The Jerome P. Parker-Harris Company, Memphis, Tenn., will erect a garage and automobile repair plant to cost \$40,000. A site 74 x 130 ft. has been secured.

P. Whitaker & Son have made plans for an ice cream factory to be built at Columbia, Tenn., and will be in the market for refrigerating and power equipment.

R. C. Houston, Memphis, Tenn., is asking for prices on a cross-compound engine and gasoline engine; an electric generator and several pumps of varying capacities.

The Modern Electric Light & Power Company, Mansfield, Ark., has been incorporated with \$100,000 capital stock. C. E. Brice, president; N. Hudson, vice-president, and G. E. Gilmore, secretary.

A company is being organized at Tuscaloosa, Ala., for the purpose of establishing a gas plant. Natural gas may be piped in. L. H. Maxwell, W. H. Railford and G. B. Martin are among those interested.

The Lowe Mfg. Company is installing a dyeing plant with a capacity of 4000 lb. in its cotton mill at Huntsville, Ala.

The Mobile Pure Cane Syrup & Farming Company, Mobile, Ala., has been organized with \$24,000 capital stock for the manufacture of cane syrups. An interesting feature is that the company will grow a considerable acreage of cane for use in the plant. Machinery for the latter is to be installed in the near future.

A company is being organized at DeQueen, Ark., for the manufacture of cement. A plant with a daily capacity of 3000 barrels is projected.

The Little Rock, Ark., Railway & Electric Company will install a new intake and condensing system in its power plant in the next few months. Address D. A. Hegarty, general manager.

D. M. Farson & Company, Chicago, Ill., are reported to be considering the establishment of a \$6,000 electric light plant at Oneonta, Ala.

The plant of the Fayetteville Electric Light & Power Company, Fayetteville, Ark., will be greatly enlarged, according to plans which have been announced. An expenditure of \$20,000 in connection with new machinery has been provided for.

If the plans of W. L. Eryes, superintendent of the electric light plant and water system of Lafayette, La., are carried out, changes in the machinery providing

for alternating instead of direct current will be made. The estimated cost of the new installations is \$40,000.

A power house is to be erected at New Iberia, La., by the Southwestern Traction & Power Company, of which F. W. Crosby, New Orleans, is president.

The Geneva Plow Mfg. Company has been organized at Geneva, Ala., for the manufacture of plows and other farm implements. A. L. Campbell, W. A. Pledger and others are interested.

Two pumps, having a capacity of 1500 and 700 gal. a minute, respectively, will be installed in the water-works of Biloxi, Miss., if the bond issue of \$70,000, to be voted on June 27, is approved.

The city of McKenzie, Tenn., will open bids July 1 for constructing an electric light plant. C. H. Jenks, St. Louis, Mo., is the engineer in charge.

The city of Edgefield, S. C., has voted the issuance of \$15,000 in bonds for the construction of an electric light plant. Specifications can be had from the Mayor.

Quotations on boilers are being asked by Matthews & Fry, Helena, Ark.

The Tuscaloosa, Ala., Iron Works will have its foundry and machine shop in operation by June 1. It will also manufacture tramcars for use in logging operations.

Large improvements in the mill of the Farmers' Cotton Oil Company, Huntsville, Ala., are to be made this summer, it is announced. New machinery costing \$25,000 will be installed.

St. Louis

St. Louis, Mo., May 27, 1911.

The Donovan Iron & Supply Company will enlarge its plant by removal to the old site of the John Nooter Boiler Works Company, 812-816 N. First street, which it has acquired together with adjoining vacant land on which its machine shop will be built.

The Gregory DeHart Cushion Steel Spring Tire Company is to establish a plant here for the manufacture of steel-spring tires for automobiles and motorcycles. It is a new company whose product has been undergoing tests before establishing a complete plant.

The Christopher & Simpson Architectural Iron & Foundry Company has completed arrangements for the construction and thorough equipment of a new bridge shop adjoining the present plant. The outlay will exceed \$50,000.

The Fulton Iron Works has bought a site and will build a \$300,000 plant on the western part of this city, removing from its present site near the river front. The company has increased its capital from \$250,000 to \$400,000.

The Wrought Iron Range Company is completing plans for removal from the center of the city to a site in the western suburbs where a much larger and more complete plant will be built and equipped.

The Hoffman-Pollhans Clock Mfg. Company has been incorporated here and will build a plant for the manufacture of a specially designed time keeper.

The Globe Heating and Engineering Company has been incorporated in St. Louis for the manufacture and installation of heating plants, vacuum ventilation systems, etc.

The Star Disc Machine Company has been incorporated at Kansas City, Mo., for the manufacture of patented devices and will install machinery in a building leased for its plant.

The contract for boilers to be used in the heating and lighting plant of the new city hall, municipal courts building and jail has been let at \$26,000 to the Toledo-Flanner Company, Toledo, Ohio.

The Kimball Lumber Mfg. Company, St. Louis, with \$500,000 capital, has been incorporated to engage in a lumber mill and manufacturing business, the first board of directors being Phin Kimball, LoArk, Iowa; M. J. D. Rast, Frederick Vierling and Fred A. Gissler, St. Louis.

The Weber Mfg. Company, St. Louis, has been incorporated by R. A. Shotwell, F. C. Shotwell and J. C. Banks to do a general sheet metal, heating and metal roofing business.

The David Ranken Jr. School of Mechanical Trades is to more than double its present capacity by the erection of a new building which is to be very completely equipped with machinery for the use of the students whose numbers have already exceeded the capacity of the building erected two years ago. The school has an endowment of about \$3,000,000.

THE MACHINERY MARKETS

Eastern Canada

TORONTO, ONT., May 27, 1911.

William J. Hayes, president of the Haynes Langenberg Mfg. Company, manufacturer of furnaces, etc., denies that his company had any part in the merger of furnace manufacturing companies reported from Chicago the past week. Mr. B. B. Culver, of the Home Comfort Wrought Iron Range Company also said that his company had nothing to do with the new organization. Both gentlemen said that they had been approached by the promoters of the merger, but had declined participation.

A committee of citizens of St. Joseph, Mo., has been appointed by the Mayor to investigate the city electric light plant and to confer with the Mayor and Council in regard to extending its capacity.

The King Foundry Company has completed a new foundry building at St. Joseph, Mo., into which it is moving its present equipment from Nebraska City.

Western Canada

WINNIPEG, MAN., May 26, 1911.

The immigrants coming into Canada in such large numbers this year are nearly all locating in the west. They have good buying power, and add greatly to the market importance of the Western provinces. Large quantities of manufactured goods that would either not have been produced in Canada at all or would have had to be exported are being sold to immigrants, who are also contributing to the purchase of imports.

It is reported from Vancouver, B. C., that an English company will shortly be incorporated with a capital stock of \$20,000,000 to build and operate works at Pitt Meadows, opposite Coquitlam, B. C. Blast furnaces and open-hearth steel furnaces and rolling mills are to be started. William Owen, M. E., from London, England, is named as the initiator of the project. He has been in Vancouver for some weeks. The company will, it is said, be an English one registered in Canada. It is further stated that the plant and machinery will be brought from Europe.

The \$3,000,000 issue of bonds recently offered in London by the B. C. Electric Company, Vancouver, B. C., was over subscribed.

Plans for the enlargement of the Empress Hotel, at Victoria, B. C., have been prepared by the Canadian Pacific Railway Company, the cost to be \$200,000.

A nine-months' extension of time has been granted to the Western Canada Power Company, Vancouver, B. C.; one turbine is now on the way from Europe.

An additional 10,500 hp. is being added to the Lake Buntzen generating plant of the British Columbia Electric Railway, Vancouver, B. C. Contracts for the installation of the generator, water wheel and pipe line have been let as follows: The Canadian General Electric Company received the contract for the generator; McDougall & Company, the contract for a Dobie water wheel.

The City Council of Victoria, B. C., is calling for tenders for 300 electric-light standards.

An American syndicate, in which F. C. Adams, Portland, Ore., and Charles A. Barium, Revelstoke, B. C., are interested, has acquired a vast tract of timber land in the interior of British Columbia. It is the reported intention of the syndicate to build large pulp and paper mills in Revelstoke, and a large sawmill at Big Eddy, near Revelstoke, and to install a power plant that will serve both industries. It is stated that \$2,000,000 will be spent in these plants.

Turbines are being installed at the dam the Canadian Pacific Railway Company is building at Bassano, Alberta.

The Industrial Sites Committee, Calgary, Ont., has purchased 97 acres of land for factory locations.

The City Council of Edmonton, Alberta, is considering a proposal to establish a municipal gas plant.

Cardston, Alberta, is considering the question of installing municipal water works.

Up to June 13, scaled tenders will be received by the Mayor of Prince Albert, Sask., for the construction of dam and headworks and canal and power station foundations of a hydroelectric power plant the city is to have at La Colle Falls, 25 miles distant.

The Dominion Government will call for tenders next month for the construction of the first 120 miles of its Hudson Bay Railway.

The ratepayers of Fort William, Ont., have approved the by-law to bonus the Superior Rolling Mills Company, in which H. S. Holt, C. R. Hosmer and other Montreal capitalists are interested. Work is to be begun at once on the plant.

In his address at the annual meeting of the Imperial Bank of Canada, held in Toronto May 25, the president of that institution, whose operations are of national scope, said that the bank had just received reports from about 100 manufacturing points in the country, all to the effect that business was exceedingly active and healthy. He added, "Everywhere prosperity reigns." This testimony of one of the most responsible and careful bankers in the country is in agreement with every other evidence on the point. According to the estimate of William Whyte, vice-president of the Canadian Pacific Railway Company, and manager of the lines west of the Great Lakes, the wheat crop of the prairie provinces promises to yield about 200,000,000 bushels, which is 100 per cent. more than the yield of last year, when drought did great havoc. It is safe to say that the manufacturing industries of the country as a whole were never busier than they are now. Money will be pouring into the country this year. The lowering of steel prices across the line will, it is believed, rather stimulate than check business here. The material is needed, whatever the price and large consumers cannot afford to hold off the market in the hope that a waiting game will bring prices still further down.

It is recognized that there is too much speculation in real estate, and that money tied up in such speculation is much needed for the financing of live business. This is particularly felt in some of the Western cities. There are expectations of an early general election. The announcement of new Government projects such as the beginning of construction of the Hudson Bay Railroad is taken as an indication of a coming appeal to the country. It would appear too as if the Government could not put off an appeal very long, as the opposition is in a position to force its hand by obstruction of supply, resistance to the Knox-Fielding reciprocity pact and contention over any redistribution bill that may be introduced. A general election would not greatly moderate the present trade activity, as the main issue affecting trade would be reciprocity, and that cannot be made to look much more forbidding to trade than it has been, made to appear for the first four months, during which trade has gone on increasing.

The town clerk of Tavistock, Ont., will receive up to June 14, tenders for approximately 2250 ft. of 8-in., 2550 ft. of 6-in. and 2100 ft. of 4-in. cast-iron water pipe, about 7 tons of special castings, about 16 hydrants, valves, etc. and a steel elevated tank.

Contracts have been let for the construction of the Chatham Malleable Iron & Steel Company's buildings at Chatham, Ont.

The Preston Car & Coach Company, Preston, Ont., will enlarge its plant.

The Morrow Screw Company, Ingersoll, Ont., proposes to extend its plant at an estimated expenditure of \$150,000.

The McClary Mfg. Company, London, Ont., is building an extension to its plant.

The board of control of Toronto has awarded to the Canada Foundry Company, Toronto, the contract to make the 72-in. pipe for a water-works intake, at \$62,125. Tenders were also received from the Drummond-McCall Company, Montreal; the Marine Signal Company, the Polson Iron Works Company, and the John Inglis Company, Toronto.

The town of Brockville, Ont., has awarded a contract to Laurie & Lamb, Montreal, for a 450-hp. Bellis & Morrow engine with condenser; and a contract to Kilmer, Pullen & Burnham, Toronto, for a 300-kw. directly connected generator. This will complete the equipment of Brockville's municipal power station.

The Canadian Metal Seal Company has been incorporated in Ottawa with a capital stock of \$300,000, its head office to be in Montreal. It will manufacture metal seals, nozzles, powder cans, etc.

The Ogilvie Flour Mills Company's plant at Seaforth, Ont., is to be equipped with electrical machinery.

William McVittie has begun the construction of a power plant at the Water Fall, six miles below Wahnapiatae, Ont. It is said that the Mond Nickel Company will use some of the power at its new plant at Romford, Ont.

The penstocks, water wheels, generators and other equipment required for Price Bros. Company's new pulp mills at Jonquiere, Que., will be purchased by R. S. Kelsch, consulting engineer, Montreal.

THE MACHINERY MARKETS

The town of Campbellford, Ont., has placed an order with the Canadian General Electric Company, Peterborough, Ont., for a gas producer generating plant of the following description: Two Premier gas engines of 172 and 344 hp., and two gas producers. These to be used with one 100 and one 200 kw. a.c. belted generator, 3-phase, 60-cycle and 2300 volts. The plant has to be delivered and in running order by September 1.

The plant of the Canadian Locomotive Works Company, Kingston, Ont., has been purchased for an English syndicate, made up of engineers and capitalists. It is said to be the purpose of the new owners to increase the capital stock of the company to \$5,000,000 and double the capacity of the works.

The E. & T. Fairbanks Company, Sherbrooke, Ont., has built a three-story factory to be used in the manufacture of the scales contracted for by the Montreal Harbor Board.

Ross & Holgate, Montreal, have let the contracts for the building of a hydroelectric plant at Porcupine, Ont., for E. A. Walberg. The electric machinery is to be supplied by the Canadian Westinghouse Company, Hamilton, Ont., and two 3500-hp. turbines will be furnished by S. Morgan Smith Company, York, Pa.

The ratepayers of Galt, Ont., have ratified a by-law authorizing the Town Council to expend \$25,000 upon extensions of the municipal hydroelectric system.

The Canada Iron Corporation, Montreal, has under construction at its iron mines near Tarbrook, N. S., a washing plant that will cost \$75,000.

The Dominion Bridge Company, Montreal, is preparing to close Second and Third avenues at Lachine, Que., for the purpose of extending its shops and yard.

The Montreal Light, Heat & Power Company will lay 450,000 ft. of electric cable duct in Montreal this summer. The power cable to be used will be supplied by the Canadian-British Cable Company, Montreal, the price being about \$100,000.

The Wayagamack Pulp & Paper Company, Three Rivers, Que., has placed an order with the Lancashire Dynamo & Motor Company for the equipment of the new pulp and paper mill at Three Rivers. The order includes 44 motors from 400 hp. down, with starting equipment therefor. The switch gear is to be manufactured by Eckstein, Heap & Co., Manchester, England.

The Hydro-Electric Commission of Ontario is negotiating for the purchase of the Chats Falls water power on the Ottawa River from its private owner, the intention of the commission being to develop power there as a center from which to distribute to towns and cities in that part of Ontario. It is understood that \$50,000 has been offered, and that twice that amount has been asked, for the property.

L. N. Senecal, secretary of the Water Works Commission, Montreal, will receive tenders to June 29 for the installing of pumping machinery, blower and cranes of the municipal filtration plant.

The City Council of Montreal has authorized tenders to be called for for building sidewalks at a cost of about \$500,000; for water mains, \$677,000; for sewers, \$616,000, and for other public improvements, \$720,000.

The Canadian General Development Company, Montreal, has begun work on the central generating station of the Acadia Coal Company's electrical power plant at Stellarton, N. S. Two units of 1500 kw. each are being installed by the Canadian General Electric Company, Peterborough, Ont., and the Allgemeine Gesellschaft. The generators will be connected with steam turbines. Babcock & Wilcox, Montreal, have the contract for installing boilers, stokers and a coal and ash-handling plant. Contracts are to be placed soon for two electrically driven hoisting engines in the Acadia Coal Company's mines. Compressors, fans, pumps and other machinery are to be operated by electricity. The power plant and machinery equipment thus being put in at the company's mines will cost about \$400,000. The work is to be completed before the end of the year.

The Imperial Mfg. Company, Warren, Pa., manufacturers of saddlery, hardware and patented specialties, will establish its Canadian branch plant at Welland, Ont. A site has been purchased at Patterson avenue and Major street and construction of a factory building will be commenced at once.

The Garden City Paper Mills, Ltd., has been incorporated with a capital stock of \$100,000. It is to carry on a paper manufacturing business in St. Catharines, Ont.

The Pacific Coast

PORTLAND, ORE., May 23, 1911.

The demand for machinery in general is well sustained, though no material increase is noted. Metal-working tools are rather quiet. No inquiries of any great importance are coming out at present, and the demand is limited, for the most part, to small articles. The movement of general shop equipment is very fair, however, in the aggregate, and the outlook is very favorable for this class of business. A somewhat similar condition prevails in other lines of machinery. Aside from a few large hydroelectric projects in various parts of the coast there are few propositions in sight which call for much heavy equipment, but the quietness in this line is offset by an active demand for small machinery of many descriptions.

No great development of the lumber industry of this territory appears likely for this year. The market has been dull since the first of the year, and a movement is now under way to curtail the output of all the mills in the north coast district. A few of the sawmills are making improvements with a view to efficiency and economy, and with the approach of the fruit season many box factories are increasing their equipment, and a few new ones are being installed, but aside from this woodworking machinery is quiet. Several of the Puget Sound shops are still busy on mining machinery, and a good volume of marine work is under way, though the latter consists largely of repair work. Dredging operations in this vicinity call for considerable machinery, and some orders for quarry equipment are coming out.

Portland firms have been invited to bid on the construction of a suction dredge for the Standard American Dredging Company, San Francisco.

A. G. Pace, Seattle, Wash., has patents on a new gas engine, manufactured by the Moran Company, of that city. The engine is designed to use crude petroleum.

The Willamette Iron & Steel Works is completing the installation of pumping machinery in an 18-in. suction dredge for the Spokane, Portland & Seattle Railway.

A proposition has been made to the East Side Business Men's Club, this city, with a view to the establishment of an automobile factory.

The Island Transportation Company, Seattle, Wash., is having plans drawn for a new steamer, to cost about \$50,000.

The Moran Company, Seattle, Wash., has the contract for installing an oil-burning outfit in the Canadian steamer Princess Adelaide.

The Grangeville, Idaho, Light & Power Company is considering the installation of a new plant.

The Inland Empire Biscuit Company, Spokane, Wash., is preparing to remodel its engine-room and install a new heating system.

The Los Angeles Basket Company, Los Angeles, Cal., is putting in a large plant at Vashon, Wash. A number of resaws and a lot of basket and veneer machinery will be installed.

The Empire State Mfg. Company has been incorporated at Spokane, Wash., with a capital stock of \$200,000, by C. A. Bassett, E. J. Peterson and others, for the manufacture of a floor-scraping device.

Arrangements are being made for the installation of a large pumping plant, near Nyssa, Ore., for the irrigation of 5000 acres.

The Lewiston-Clarkston Improvement Company is preparing to make a number of improvements in its power plant at Catello, Idaho.

The town of Payette, Idaho, is considering the installation of a lot of pumping machinery.

It is reported that the E. K. Wood Lumber Company will erect a lumber mill with a capacity of about 250,000 ft. per day at Anacortes, Wash.

The Sedro Veneer Factory, Sedro-Woolley, Wash., is planning a number of improvements, including the installation of a large hydraulic press.

New bids will be received June 14 for installing an oil-burning outfit on the government dredge Clatsop, at this city.

Representatives of the Olympic Portland Cement Company, which is preparing to erect a large plant at Bellingham, Wash., are now in the East making arrangements for the delivery of machinery. Alexander Baillie, Seattle, Wash., is handling the details of the project.

The D. J. Wilson Company is preparing to erect a box factory at Lewiston, Idaho.

THE MACHINERY MARKETS

Texas

AUSTIN, TEXAS, May 27, 1911.

The unusually good prospects for a large cotton crop are causing a heavy demand for ginning and compress machinery. Besides the many new ginning plants that have been ordered and are being installed, a great deal of work is being done in the way of improving existing plants. Some of them are being enlarged and new machinery is being placed in others. There is a noticeable improvement in machinery trade in other lines. The general crop prospects over the State could hardly be improved upon.

The Walsh Farmers' Union Gin & Milling Company has been formed at Walsh. The incorporators are W. G. May, H. C. Bennett and S. Lester.

O. Q. Rasmussen, Stoughton, Wis., will establish a plant at Dallas for the manufacture of fertilizers.

The Francis Light & Power Company has been formed at Francis, with a capital stock of \$10,000. The incorporators are A. L. Mullergren and W. J. Donathan of Poteau, and W. P. Chism, Albert Goetter and W. L. Shaffer of Francis.

The City Council of Corpus Christi has under consideration plans for the improvement and enlargement of the water supply system of the town. The damming of the Nueces River in order to provide an ample storage supply and piping of the water several miles into the city may be decided upon.

Harry Lands, New Braunfels, will install a cotton gin at Crown.

The Theodore Shade Air Brake Company has been formed at San Antonio for the purpose of erecting a factory for the manufacture of air brakes. W. E. Milligan is president; L. L. Daniel, vice-president; A. P. Villaret, secretary-treasurer.

The City Council of West has taken preliminary steps toward constructing a system of sewers. Bonds will be issued for the purpose.

O. O. Love will install a cotton gin at Dickens. The plant will be finished in time for this season's cotton crop.

S. B. Guines, Calvert, Texas, will install a modern cotton gin at Franklin to cost about \$10,000.

The Portland Development Company has been formed at Portland with a capital stock of \$60,000 for the purpose of installing systems of public utilities and making other improvements to the town. The incorporators are John G. Willacy, J. M. Eskridge and E. C. Wessendorff.

M. A. Joy, Terrell, Texas, has been granted a franchise by the City Council of that city for the construction of a sewer system and disposal plant at Sweetwater.

The Collegeport Canal Company is extending its irrigation and drainage system near Collegeport.

Mayor E. W. Brown is enlarging his irrigation pumping plant on Cow Bayou near Orange. He is installing a 90-hp. gasoline engine.

George Muennink and associates will install an ice factory at Hondo.

F. C. Henery of San Saba and associates will erect a cotton compress there to cost about \$20,000. New York men are interested in the project.

The Texas Bithulithic Company, Dallas, will install a branch plant at Austin for manufacturing paving material.

W. B. Walker & Sons will install a cold-storage plant at Austin to cost about \$75,000.

The municipal water works system at Mt. Pleasant will be improved by the installation of a new pumping plant.

The capacity of the cotton gin of the John Miesch Gin Company, Clarksville, will be doubled.

W. B. Tuttle will install a system of irrigation and a pumping plant on a tract of land 8 miles south of San Antonio.

It is reported that the shops of the International & Great Northern Railroad at Taylor will be enlarged. Considerable new machinery will be installed. The general offices of the company are at Palestine.

The Great Western Power Company has begun the preliminary work toward the installation of a large hydroelectric plant near Tucson, Ariz. A road is now being constructed to the site of the proposed dam. The latter structure will be 360 ft. high and will form a storage reservoir for an enormous supply of water for operating the hydroelectric plant.

The Homesteaders' Association of Melrose, N. M., estimate that more than 100 irrigation pumping plants

will be installed in this section this year. The association has ordered a 20-hp. engine and a 6-in. pump to test the wells that its members are putting down.

The recent adoption in the section around Estancia, N. M., of irrigating from shallow wells is causing a big demand for pumping plants. Many wells have already been put down and pumps installed. Preparations are being made to test twelve new wells and if the water supply is found sufficient pumps will be installed.

A fund of \$5000 is being raised by popular subscription at Douglas, Ariz., to put down a number of wells in the Sulphur Springs Valley with the view of developing a water supply for irrigation purposes.

The Los Indios Irrigated Land Company has been organized at San Benito, with a capital stock of \$10,000. The incorporators are J. C. Miller, J. George Bowyer and M. W. Jones.

The Pioneer Smelter Company is arranging to erect a large reduction plant near Tucson, Ariz.

The American-Aldosora Mining Company will install a reduction plant at its mines near El Tigre, State of Sonora, Mexico. Evan Lee Curley, St. Louis, Mo., is president.

The Chamber of Commerce of Houston is negotiating for the removal to that city of a structural iron works, the name of which has not yet been made public.

Government Purchases

WASHINGTON, D. C., May 31, 1911.

The commanding officer of the Rock Island Arsenal, Ill., will open separate bids June 6 for furnishing and delivering one Bickford radial drill, 3½ ft. arm; one Lucas power forcing press, No. 1, 15 tons capacity, equipped with pressure gauge and countershaft complete; one Pratt & Whitney spline milling machine complete; one 36-in. heavy high duty drill; three universal shaping machines; one induction motor, under circular No. 302, and one Cincinnati variable speed planer.

The depot quartermaster, Grays Ferry Road, Philadelphia, Pa., will open bids June 9 for furnishing and erecting one 200 hp. water-tube boiler.

M. Gray Zalinski, depot quartermaster, Army Building, Whitehall street, New York, will open bids June 15 for furnishing and installing six pumps and accessories at Fort Mills, P. I.

The office of the commanding officer, Frankford Arsenal, Philadelphia, Pa., will open bids until June 5 for furnishing and installing one 1-ton electric traveling crane at the Frankford Arsenal.

The office of the Commissioners of the District of Columbia, Washington, D. C., will open bids until June 5 for furnishing and installing complete in the McKinley Manual Training School one double-beam hand-power geared traveling crane of 4000 lb. capacity.

The Paymaster General, Navy Department, Washington, will open bids June 6 for furnishing one boring, drilling and milling machine at Mare Island, Cal.

The Department of the Interior, Washington, D. C., opened bids May 19 for installing a coal bunker and coal-handling machinery in the Freedman's Hospital, as follows: Charles A. Barker, Washington, \$15,445; Boyle Robertson Construction Company, Washington, \$18,235; John W. Danforth Company, Washington, \$14,542; J. M. Dodge Company, Philadelphia, Pa., \$21,070; Stoddard Repair Company, New York, \$15,950; Guarantee Construction Company, New York, \$21,974; R. H. Bowmont Company, Philadelphia, Pa., \$16,084.

The constructing quartermaster, Fort Caswell, N. C., opened bids April 27 for furnishing two 53 hp. single valve engines as follows: Valley Iron Works, Williamsport, Pa., \$1,513; A. D. Granger Company, New York, \$1,643; Ball Engine Company, Erie, Pa., \$3,170 and \$2,232; Harrisburg Foundry & Machine Work, Harrisburg, Pa., \$3,155; Skinner Engine Company, Erie, Pa., \$2,035; Ames Iron Works, Baltimore, Md., \$2,666 and \$2,424; Gibbs Machinery Company, \$2,015; Shepherd Engineering Company, Williamsport, Pa., \$3,207.36.

The Bureau of Yards and Dock, Navy Department, Washington, opened bids May 13 for electric lighting machinery and accessories at the Marine Corps Rifle Range, Winthrop, Md., as follows: Western Electric Company, New York, \$1,098; Fairbanks Company, Baltimore, Md., \$2,761.25; Fairbanks, Morse & Co., New York, \$3,793; Dieh Mfg. Company, Philadelphia, Pa., \$490 part; National Electrical Supply Company, Washington, D. C., \$3,707.

CURRENT METAL PRICES.

The following quotations are for small lots, New York. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—		Genuine Iron Sheets—		METALS—	
Bar Iron from Store—		Galvanized		Tin—	
Refined Iron:		Nos. 22 and 24.....		Straits Pig.....	
1 1/4 to 1 1/2 in. round and square.....		No. 26.....		Lake Ingot.....	
1 1/4 to 1 1/2 in. x 3/4 to 1 in.....		No. 28.....		Electrolytic.....	
1 1/4 to 1 1/2 in. x 3/4 to 5-1.....		Corrugated Roofing—		Casting.....	
Rods—1/2 and 11-16 round and square.....		2 1/2 in. corrugated.....		Copper—	
Angles:		No. 24.....		Lake Ingot.....	
3 in. x 3/4 in. and larger.....		No. 26.....		Electrolytic.....	
3 in. x 3-16 in. and 1/2 in.....		No. 28.....		Casting.....	
1 1/4 to 2 1/2 in. x 1/2 in.....		Tin Plates—		Solder—	
1 1/4 to 2 1/2 in. x 3-16 in. and thicker.....		American Charcoal Plates (per box)		Western.....	
1 to 1 1/4 in. x 1/2 in.....		"A.A.A." Charcoal:		Zinc—	
1 to 1 1/4 in. x 3-16 in.....		IC, 14 x 20.....		No. 0, base, easks..	
3/4 x 1/2 in.....		IX, 14 x 20.....		Lead—	
3/4 in. x 1/2 in.....		A. Charcoal:		American Pig.....	
1/2 x 3-32 in.....		IC, 14 x 20.....		Bar.....	
Teas:		American Coke Plates—Bessemer—		Solder—	
1 in.....		IC, 14 x 20.....		1/2 & 1/4, guaranteed.....	
1 1/4 in.....		IX, 14 x 20.....		No. 1.....	
1 1/2 to 2 1/2 x 3-16 in.....		American Terne Plates—		Refined.....	
1 1/2 to 2 1/2 x 3-16 in.....		IC, 20 x 28 with an 8 lb. coating.....		Prices of Solder indicated by private brand v.	
3 in. and larger.....		IX, 20 x 28 with an 8 lb. coating.....		according to composition.	
Beams.....		Seamless Brass Tubes—		Antimony—	
Channels, 3 in. and larger.....		List November 13, 1908.....		Cookson.....	
Bands—1 1/4 to 6 x 3-16 to No. 8.....		Brass Tubes, Iron Pipe Sizes—		Bismuth—	
"Burden's Best" Iron, base price.....		List November 13, 1908.....		Per lb.....	
Burden's "H. B. & S." Iron, base price.....		Copper Tubes—		Aluminum—	
Norway Bars.....		List November 13, 1908.....		No. 1 Aluminum (guaranteed over 99% pure), in	
Merchant Steel from Store—		Base price, 18¢		Ingots for remelting.....	
Bessemer Machinery.....		Base price, 18¢		Rods & Wire.....	
Toe Chalk, Tire and Sleigh Shoe.....		Copper Tubes—		Sheets.....	
Best Cast Steel base price in small lots.....		List November 13, 1908.....		Old Metals—	
Sheets from Store—		Base price, 21¢		Dealers' Purchasing Prices Paid in New York.	
Black,		Brazed Brass Tubes—		Copper, heavy and crucible.....	
One Pass, C.R. R. G.		List February 1, 1911.....		Copper, heavy and wire.....	
Soft Steel, Cleaned.....		High Brass Rods—		Copper, light and bottoms.....	
No. 16.....		List February 1, 1911.....		Brass, heavy.....	
Nos. 18 to 20.....		Roll and Sheet Brass—		Brass, light.....	
Nos. 22 and 24.....		List February 1, 1911.....		Heavy machine composition.....	
No. 26.....		Brass Wire—		Clean brass turnings.....	
No. 28.....		List February 1, 1911.....		Composition turnings.....	
Russia, Planished &c.		Copper Wire—		Lead, heavy.....	
Genuine Russia, according to assort-		Base Price, Carload lots mill 13 1/4¢		Lead, tea.....	
ment.....		Copper Sheets—		Zinc, scrap.....	
Patent Planished, W. Dewees.....		Sheet Copper Hot Rolled, 16 oz. (quantity			
Wood.....		lots).....			
Galvanized		Sheet Copper Cold Rolled, 16¢ lb advance			
Nos. 12 and 14.....		over Hot Rolled.....			
Nos. 22 to 24.....		Sheet Copper Polished 20 in. wide and			
No. 26.....		under, 1¢ lb square foot.....			
No. 28.....		Sheet Copper Polished over 20 in. wide, 2¢			
No 20 and lighter 36 inches wide, 25¢ higher.		lb square foot.....			
		Planished Copper, 1¢ lb square foot more			
		than Polished.....			

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